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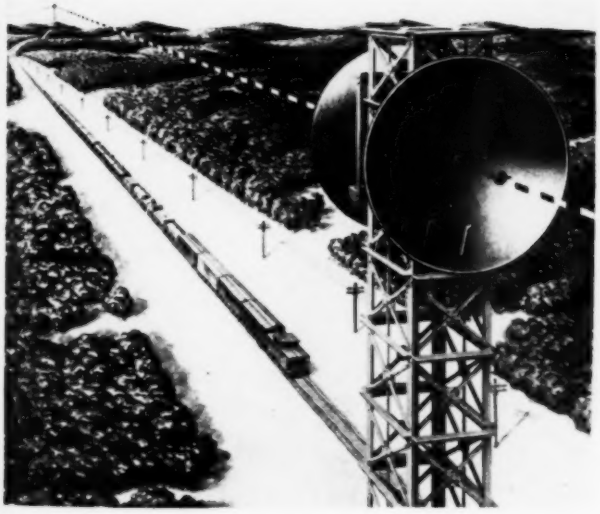
INTERNATIONAL Railway Journal

February 1961



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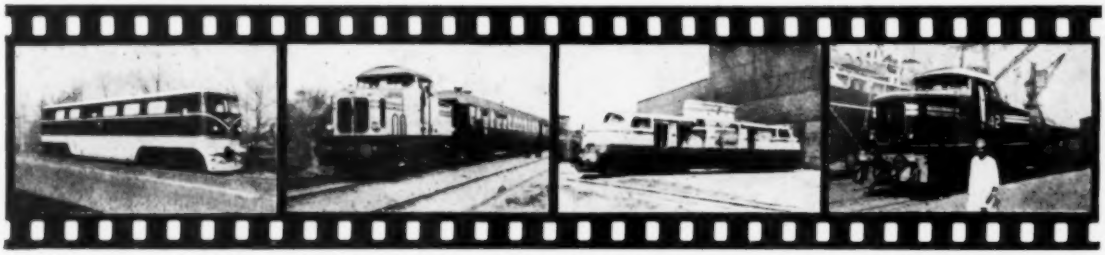

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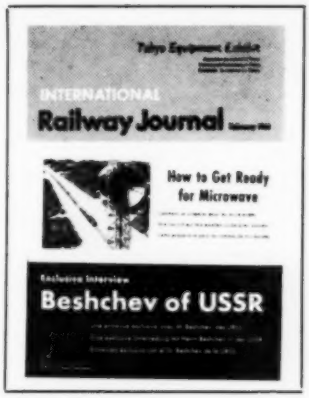

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WORLD REPORT

Argentina to Undertake Comprehensive Transport Study

The International Bank for Reconstruction and Development has recently appointed Lieutenant-General Thomas B. Larkin, USA (Ret), as technical director of a comprehensive study of transportation in Argentina, which is expected to provide the basis for a long-term program to develop the country's transportation network (IRJ, October 1960, p. 7). The United Nations Special Fund has granted $475,000 to pay part of the foreign exchange costs involved, and the Argentine government has allotted 100,000,000 pesos (about $1,200,000 US) to cover remaining external costs and all local expenses. The Transportation Planning Group will be composed of local and foreign experts in economics, engineering and transportation, under the Argentine Ministry of Public Works and Services. The Minister of Public Works, Ing. Alberto R. Constantini, will serve as chairman of the group, and work with General Larkin in directing its activities.

Basic studies of Argentina's requirements for rail, highway and water transport are expected to be completed by the end of 1961. The studies will provide the basis for an integrated plan for investment and related measures for transport improvement and development. The planning group will probably continue as a permanent agency of the government, but in future with a staff composed largely of Argentine nationals.

●

BULGARIA: Stanko Todorov, chairman of the State Planning Commission, recently told parliament that electrification of the Sofia-Plovdiv railway line would be completed during 1961.

AUSTRALIA: G. F. Brown, a commissioner of the Victorian Railways, has been appointed deputy chairman, succeeding N. Quail, who retired at the end of 1960. E. P. Rogan has been named commissioner.

. . . A new £3,000,000 interstate railway terminal is being built at Melbourne. Its passenger facilities, says the Victorian minister of transport, "will rival those of the most modern airport."

GREAT BRITAIN: British Railways Type 4 diesel-electric locomotives being built at Derby and Crewe with Sulzer-Crompton-Parkinson equipment are now being turned out with uprated engines. The earlier units had a continuous output of 2300 hp, which has been increased to 2500 hp by use of a newer version of the Sulzer 12-cylinder double-bank engine, type 12LDA28-B.

USA: First tests of a new mobile cargo container for both rail and sea transportation have been completed by United States Lines. In a five-week test the 6.1-meter aluminum and steel container was shipped from New York to Bremerhaven with a sealed cargo; from Bremerhaven the container was handled by rail to Osnabrück for a cargo of photographic paper, and returned to New York via Hamburg.

. . . President Howard Simpson of the Baltimore & Ohio has written stockholders of that company advocating its merger with the Chesapeake & Ohio. The C&O has reportedly received assents to such a merger from owners of some 55 per cent of all B&O shares (IRJ, January, p. 64).

NEW ZEALAND: A new station costing £1,000,000 has been opened at Christchurch.

PAKISTAN: Railway service through India for passengers and freight between East and West Pakistan is to begin on 1 April, Communications Minister F. M. Khan announced in mid-December. An accord covering the traffic was signed with India during November.

CHINA: According to Chinese sources, final results for 1959 railway operations showed a 42 per cent increase over 1958, to a total of 542 million tons. Tonnage for 1960 was expected to reach 720 million, a further increase of 33 per cent. Figures for 1959 showed a total of 240,000 million ton-km and an average length of haul of 440 km. Passenger traffic for 1960 was expected to reach 530 million passengers, a 10 per cent increase over 1959. Cost of operation for 1959 was reported to be 15 per cent below 1958, and labor productivity 11 per cent higher.

. . . Plans have reportedly been completed for a railway line to link the Tibetan capital of Lhasa with Lanchow in Lansu province. The line is scheduled to be completed during 1962.

. . . Workers of the Number One motor vehicle plant at Changchun celebrated, on October 15, the completion of 1000 small industrial locomotives for mining railways in the coal and iron industries. Largely adapted from parts of the plant's main product, the "Liberation" truck, the locomotives have a speed of 25 to 40 km/h and can haul a 100-ton load.

. . . During 1960 the Fengtai station in the south-eastern outskirts of Peking, which is the junction of four major rail lines, installed closed-circuit television, telephones, an automatic train control system, power switches, and similar devices which have completely ended manual labor in connection with the classification of freight cars, according to the Chinese press. The time required to classify a 34-car train has been cut in half, it is reported. These improvements were introduced in anticipation of a 40 per cent rise in the volume of freight traffic during 1960.

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(Inserate für die Märznummer müssen vor dem. 1. Februar eingesandt werden).

RESUMEN

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INTERNATIONAL RAILWAY JOURNAL

World Market

▶ *British Railways.*—Are planning to rebuild Reading General station and modernize the track layout and signaling installation, at a cost of about £2,500,000. Work will start this year. The new signaling system will permit closing of 15 existing signal towers.

▶ *British Railways (North Eastern Region).*—Have awarded the following contracts to cover technical equipment for a new mechanized marshaling (classification) yard at Newport, near Middlesbrough: To Westinghouse Brake & Signal Co., Ltd., two contracts for signaling and control equipment inside the yard and on main approach lines, including switch and retarder controls in the yard; to British Insulated Callender's Cables, Ltd., two contracts for yard floodlighting and signaling cables; and to Tarmac Group, one contract for construction of two control towers.

▶ *British Railways (Scottish Region).*—Have awarded to Kinnear Moodie & Co., of Glasgow, a contract for reconstruction of part of a pier in Stranraer Harbor.

▶ *Burma Railway.*—Will award contracts for 15 meter-gauge rail inspection cars.

▶ *Chile.*—A railroad rehabilitation and expansion program recently announced by the Chilean Under Secretary of Transportation, to cost an estimated $250,000,000, has been implemented by a $30,000,000 credit authorized by the Export-Import Bank (US). Repayable over 12 years, the Eximbank credit will cover orders still to be placed with US manufacturers. The program will include purchase of locomotives and other rolling stock; signaling and communications equipment; track and shop machinery; welding materials, and general maintenance equipment.

▶ *Colonial Sugar Refining Co. (Australia).*—Has awarded to Humes, Ltd., Brisbane, a long-term contract for supply of 610-mm-gauge concrete cross ties for its sugar mill railways in Queensland.

▶ *East African Railways and Harbours.*—The Transport Advisory Council has recommended expenditure of £239,000 on purchase of 69 units of rolling stock, including refrigerated containers, insulated freight cars and brake vans. It also has recommended £102,250 for conversion of 76 stock cars, brake vans and cabooses. It has further recommended £686,000 for extension from Lira to Gulu of a line now being built from Soroti to Lira at a cost of £670,000.

▶ *Emu Bay Railway Co.*—Has ordered three 800-hp diesel-hydraulic locomotives from Tulloch Ltd. of Rhodes, NSW. The locomotives will have Paxman engines and Krupp hydraulic transmissions. The EBR operates between Burnie and Zeehan in northwestern Tasmania.

▶ *English Electric Co.*—Has built, as a private venture, a prototype 2700-hp experimental gas-turbine locomotive. The locomotive, designated GT3, began trial operation on the London Midland Region of the British Railways on 9 Jan., and is expected to go into revenue service later this year. It has a 4–6–0 wheel arrangement, and consists of a locomotive and tender with total length of more than 20 m and weight of about 125,000 kg, including train-heating equipment. Power

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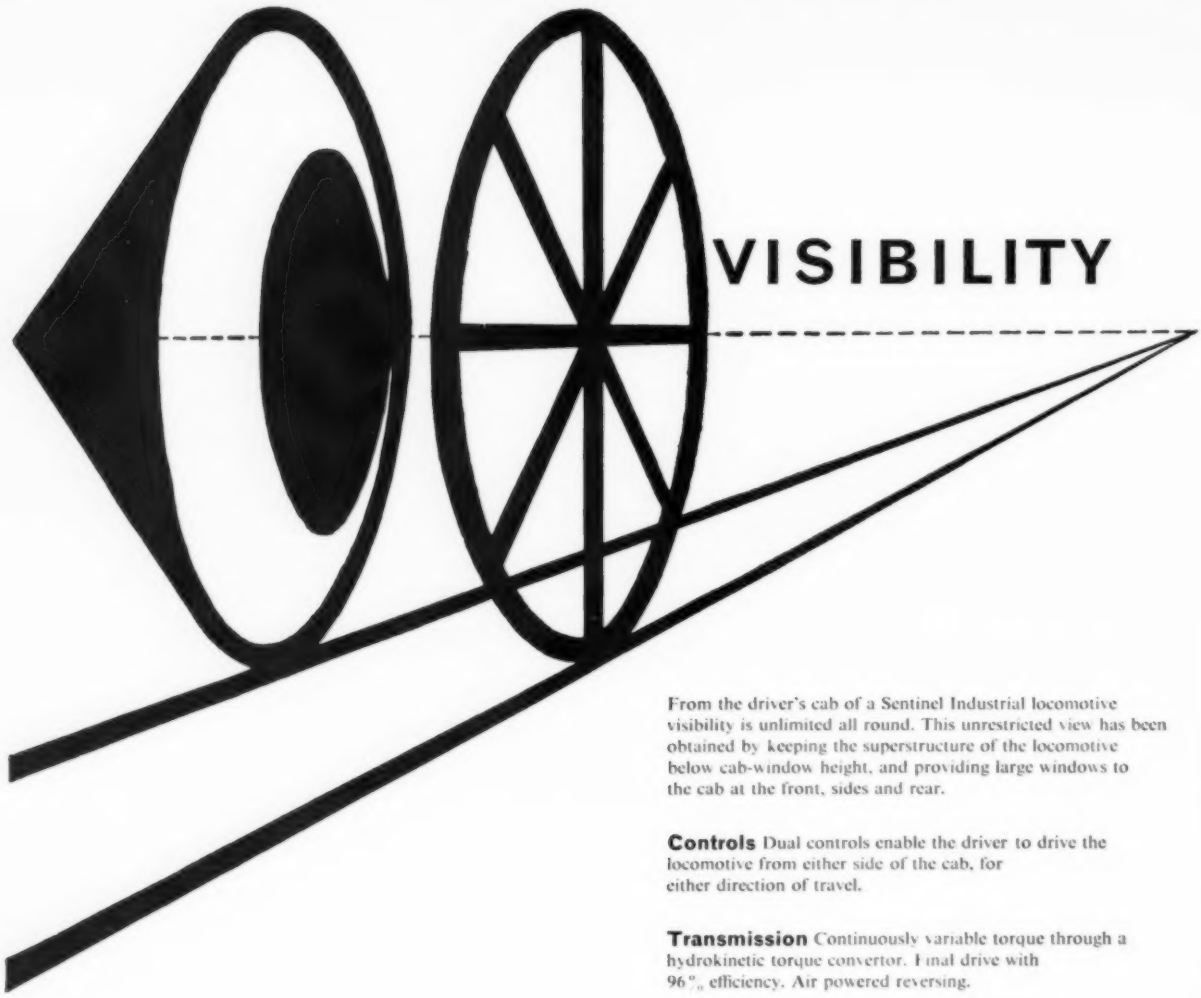

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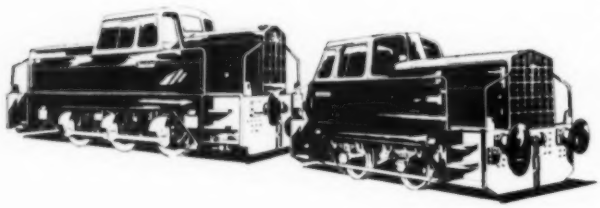

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'Railways Are 90% Personnel'

Experienced railway managers have often said "railways are 90% personnel." The statement is largely true.

Because a railway extends over long distances, and its employees are widely dispersed, the human factor is especially important. In many instances, supervisors cannot be on the scene and employees must exercise their own initiative and skill to assure operation at maximum safety and efficiency levels.

In view of the general awareness of such conditions, it is surprising how few railways have taken advantage of the advances made in behavioral sciences. Although railway technology has improved greatly, there has not been parallel progress in comprehension and understanding of human resources. Three reasons are often cited for this imbalance: the shortage of skilled specialists in many countries; limited budgets, and the belief that "anybody can take care of personnel problems."

Use Modern Techniques

There are, however, definite disadvantages when a railway fails to make the most of modern techniques. Professor José da Silveira Pontual made this point in his prize-winning paper presented to the recent Tenth Pan American Railway Congress in Brazil.

"The speed of progress that characterizes the modern world," he said, "demands from every executive maximum utilization of available scientific resources, not only in technological and methodological aspects, but in the mobilization of the productive energies of the human element. The penalty (for not doing so) is to contribute to the underdevelopment of his section, his company and his country."

In his paper, "Psychotechnical Advising in Railway Enterprises," Professor Pontual defines psychotechnics as "the study of psychology and related sciences, aiming to elaborate and to apply techniques and processes that may contribute to the solution of human problems of adjustment . . ." He believes that too many railway administrative policies are based on what he describes as "the incomplete

CONTINUED

'Les Chemins de Fer sont pour 90% du Personnel'

Une recommandation pour une plus ample utilisation des connaissances actuelles scientifiques du comportement par la direction des chemins de fer, fut présentée au Dixième Congrès Ferroviaire Pan Américain à Rio (IRJ janvier 1961, p. 46) dans un rapport, ayant remporté un prix, de José da Silveira Pontual, directeur du Centre d'Assistance Psychotechnique de la société fédérale des Chemins de Fer du Brésil, et professeur et lecteur en psychologie et psychotechnologie appliquées. Nous présentons ici les opinions du professeur Pontual, comprenant un aperçu spécifique de méthodes pour l'établissement d'un conseil consultatif psychotechnique aux chemins de fer. Aux fins d'illustrer les opinions exprimées par le professeur Pontual, nous ajoutons un résumé de l'application de la connaissance du comportement, telle qu'elle a été réalisée dans quelques unes des lignes de chemins de fer les plus importantes du monde.

'Eisenbahnen = 90% Personal'

Ein Appell, seitens der Eisenbahndirektionen, grösseren Gebrauch von den heutigen Kenntnissen der Verhaltenswissenschaft zu machen, wurde an die Teilnehmer des zehnten Panamerikanischen Eisenbahn-Kongresses (IRJ, Januar 1961, S. 46) gerichtet und zwar in Form eines preisgekrönten Exposés von Herrn José da Silveira Pontual, Direktor des Psychotechnischen Hilfszentrums des Föderalistischen Eisenbahnsystems von Brasilien. Professor Pontuals Standpunkt ist hierin wiedergegeben nebst einer charakteristischen Übersicht über Methoden für die Errichtung einer psychotechnischen Eisenbahn-Beratungsstelle. Im Anschluss an die Ausführungen von Professor Pontual wurde ebenfalls eine Zusammenfassung jüngster Versuche hinsichtlich der Anwendung der Verhaltenswissenschaft auf einigen führenden internationalen Eisenbahnsystemen hinzugefügt.

Ferrocarriles se basan por un 90% en personal

Con ocasión del décimo Congreso Panamericano de Ferrocarriles celebrado en Río de Janeiro (véase IRJ, número de enero, pág. 46), el Señor José da Silveira Pontual, Director del Centro Psicotécnico de los Ferrocarriles Federales del Brasil, y profesor de psicología y psicotecnología, señaló, en una conferencia premiada, la necesidad de aplicar los resultados de estas ciencias a la gestión de ferrocarriles. Este artículo contiene las opiniones expresadas por el Profesor Pontual, así como el resumen de los métodos recomendados para crear una entidad psicotécnica ferroviaria. Para explicar las ideas expresadas por el Profesor Pontual, el artículo contiene también un resumen de experiencias de la aplicación de las ciencias psicotecnológicas a unos de los principales sistemas ferroviarios del mundo.

'. . . psychotechnics is to behavioral and social sciences

view of the worker"—especially in terms of his adjustment to his work, his motivation and his potential for development. A railway manager cannot, for example, eliminate his personnel problems merely by establishing a good formal organization. Nor will a good disciplinary system alone avoid such problems.

Professor Pontual suggests, instead, that improvements in the quality and skill of railway employees can best be obtained by creation of a psychotechnical advisory unit within the organization. Such a unit will serve to study the human element, act in an advisory capacity to the railway administration, and elaborate upon and apply techniques suited to each situation. Thus it can contribute to the prevention and solution of adjustment and human relations problems. A method of approach for creating such a unit on any railway, as outlined by Professor Pontual in his paper, begins on this page.

A Staff Function

He warns, however, that psychotechnical advising is essentially a staff function; its nature as such must be fully understood. This, plus a proper relationship to top management, is basic to success. A number of railways have adopted only partial schemes, limiting the personnel unit to the selection and training of employees. Professor Pontual apparently has observed this, for in his paper he says:

"The scientific potentialities (of a psychotechnical advisory unit) would permit more extensive results if it were possible to do follow-up of men at work, advising management, avoiding human relations troubles, studying and planning incentive programs, collaborating with training and accident commissions, informing on the psychological aspects of personnel development, work hazards, etc."

With so large an array of duties in mind, it is understandable that Professor Pontual, among the conclusions in his paper, suggests that emergent countries may offer more favorable conditions for the organization of such work. In such countries, there would be less conflict with traditionalism. Also, they could draw upon the best practices elsewhere.

Wherever the railway seeks to establish its own psychotechnical advisory unit it should observe certain principles. Professor Pontual mentions the following:

Scope of the unit: Psychotechnical advising is a staff function. It cannot be allowed to interfere in administrative processes. There must be no compulsory undertones in its reports and suggestions. The psychotechnical unit should not be imposed on the railway organization, but accepted solely on the basis of its efficiency.

Position in the railway organization: The entire advisory function, including training, must be separated from the administrative department. Units devoted to the human factor serve all personnel and, in this capacity, must report directly to top management. This is the practice followed by the French and German railways, among others.

Organization of the advising unit: The unit itself can be divided into two parts—the first relating to advisory activities proper, plus research and the development of measurement tools, the second dealing with the application of techniques. The first group, reporting to top management, would handle the duties of advising management, job analysis, research and test construction, control of job performance follow-up, and the training of technical personnel. The second group, concerned with the application of techniques, could be handled by local units dispersed over the entire railway. This group would operate examination laboratories, depots for the administration of basic selection tests, and job performance follow-up and counseling functions.

Integration within the railway: The advisory unit should be well integrated with the administrative function, so as to collaborate in all cases where the human factor is involved. The cooperation of all managers is needed if the unit is to perform its staff function properly.

Creating the Advisory Unit

If a railroad wants to initiate a program of psychotechnical advising, it must adopt a general basic attitude of respect for the scientific study of the human factor, keeping in mind the principle that a little science is worse than ignorance. The utilization of psychotechnical processes may appear to be simple, but this is misleading. This lack of proper respect has caused many a failure. Should the railroad system be in a less-developed country, the program has to be established in progressive steps, which may be outlined as follows:

PRELIMINARY WORK

- Hiring a capable psychotechnician with specialized education and experience. In countries where no official courses in applied psychology are offered, it is wise to consult reputable psychotechnical associations for references.

- Planning and creating the central unit of psychotechnical advising, reporting directly to top management; hiring competent staff.

- Surveying the present status in the company of job evaluation, recruitment and selection processes, job performance follow-up, etc.

- Setting up a basic program of work and disseminating knowledge of that program by direct contact with managers and informal talks with personnel. Explanatory leaflets should be printed and distributed among personnel. Meetings with representatives of affiliated railroads should be arranged. Contacts with management should be constantly maintained while the preliminary work is getting under way.

- Verifying, in each affiliated railroad, conditions which may hinder the establishment process.

INSTALLATION OF A CENTRAL TEST ADMINISTRATION SERVICE

- Psycho-physiological analysis of jobs to establish basic requirements for each job and requirements leading to advancement in each.

- Elaboration of examination and testing programs. Planning of a central

laboratory for psychotechnical testing, so it may render service to the head office and serve as a training center of specialized personnel.

• Purchase of equipment and assembly of the laboratory. Collection of data among railroad personnel for validation of tests.

• Planning and execution of programs for the training of specialized personnel.

• Inauguration of a central laboratory under direction of a competent psychotechnician.

• Preparation of the central unit to render service to affiliated companies in test applications until local laboratories are assembled.

DEVELOPMENT AND DISSEMINATION OF PROCESSES

• Where railroad systems are concerned, planning and establishment of staff units reporting to administration and follow-up and counseling units in affiliated railroads.

• Planning and assembling of laboratories in field units.

• Operation of the system under supervision of the central unit, with progressive streamlining of processes and constant adaptation to technological progress.

The establishment process is now in progress on the Federal Railway System of Brazil, the incorporation of 17 railroads serving 22 of Brazil's 25 states. This system employs 153,000 people, and since its organization in 1937 has given a prominent place to study of human resources. In 1939 it started a program for psychotechnical and training advising, creating two units reporting to the vice-president. The program has followed the main outline here described; as far as the psychotechnical advisory unit is concerned, it is at the beginning of the second step. Equipment purchased in France for the assembly of the central laboratory was to arrive before the end of 1960, bringing that step to a close.

As far as psychotechnical tests are concerned, the program is based on the experience of the Sorocabana Railway and of the French railway system (SNCF), with necessary adaptation of the measurement methods.

At the beginning of work, soon after the elaboration of the basic program, each affiliated unit was asked to send a representative to participate in a meeting to discuss plans and processes which were to be used in the psychotechnical advisory and training units. The results of the meeting created a favorable climate in the affiliated units for the program.

The problems which have arisen so far have been dealt with satisfactorily, thanks to the decisive support given by the vice-president and other directors.

Railroad Psychotechnics in Other Countries

GERMANY — A plan for the coordination and implementation of activities related to training and selection of personnel was set up when the Reichsbahn was established in 1920. The training and education department, as well as the psychotechnical department, had a superior council which reported directly to top management. In the psychotechnical unit the superior council coordinated three major psychotechnical centers which, in turn, controlled directly, or through local assistants, the functions of psychotechnics applied to 30 branches reaching a total of 1,000,000 railroad men. Today, there exists in the Deutsche Bundesbahn a psychotechnical unit which coordinates six centers spread throughout Western Germany. The psychotechnical, training, and educational departments are separate from the personnel department.

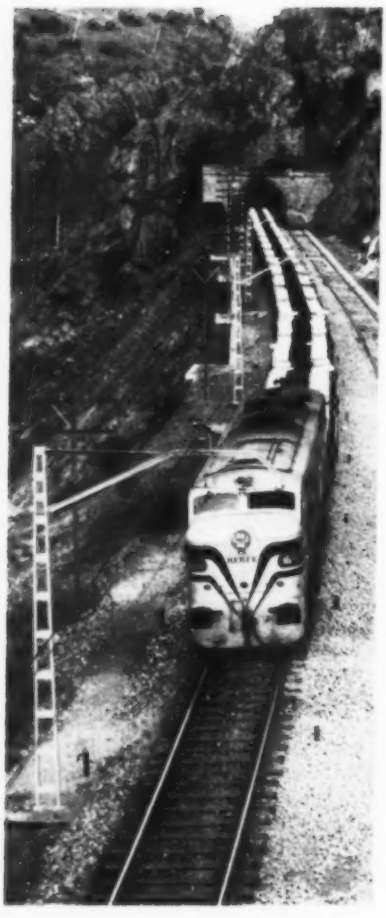
FRANCE — The psychotechnical laboratory of the Northern Railway was created in 1930. In 1937 this laboratory was incorporated into the SNCF. Today the SNCF has six centers of applied psychology with 60 depots for test administration spread throughout the country. This program represents the most efficient and widespread use of railroad psychotechnics in the western world, or possibly in the entire world.

ITALY — Since 1918 the medical service of the Italian railways has administered psychological tests. The psychological laboratory, which still exists, was founded in 1934.

SWEDEN — The Swedish Council of Personnel Administration, founded in 1954, aims to undertake research within the field of the behavioral sciences, placing its results at the disposal of all interested companies, including the Swedish State Railways. The Swedish program is extensive, but its facilities do not meet all the needs of railroads, and in the near future, the program may have to be enlarged.

UNITED STATES — Despite the great number of railroads, no great advance has been made in psychotechnical advising. The services seem to be confined only to training—possibly due to existing relations between management and labor, or to the high value placed on personnel administration. There exist today two trends in the American universities concerning the improvement of the human factor: one favors the psychotechnical point of view; the other wants to place within the scope of personnel administration functions which can only be performed properly by psychotechnicians. The first trend seems to have the upper hand at the moment.

Spain: Electrification Paces



Track renewal on Alcazar-Cordoba line was part of modernization program; electrification work was carried out at the same time.

Renouvellement de la voie Alcazar-Cordoba du programme de modernisation; l'électrification fut exécutée en même temps.

Modernisieren und gleichzeitige Elektrifizierung der Strecke Alcazar-Cordoba war ein Teil des Erneuerungsprogramms.

Renovación de la vía Alcazar-Córdoba formaba parte de la modernización; la electrificación se ejecutaba a la vez.

Under the second phase of the Reconstruction General Plan, scheduled for completion in 1962 at an estimated 10,175 million pesetas, the Spanish National Railways (RENFE) are extending electrification, completing modern signaling and control installations including Centralized Traffic Control, and adding modern rolling stock.

Among recent projects completed are those shown here: new Spanish-built electric trainsets, completion of new electrification projects, and the completion of a modern CTC installation between Vega Magaz and Leon.

The newest trainsets—first 3000-volt DC sets to be built in Spain—consist of three cars having a total length of 76 meters. The sets, of which 143 are contemplated, are being supplied by the Spanish-Swiss consortium GESTESA ("Electric Trains, SC"). Associated companies include the Spanish Maquinista Terrestre y Marítima, Material y Construcciones, Industrias Aguirena, and Material Móvil y Construcciones; Swiss firms providing technical assistance are Schindler, Swiss Car and Elevator (Schlieren), Brown Boveri, and Sécheron.

Intended for suburban service, the sets are designed for rapid acceleration and deceleration for lines with frequent stops. Seats are provided for 220 general class passengers and 28 preferential class; the three-car sets will accommodate 636 riders including standees. Top speed is approximately 150 km/h.

The most recently completed section of mainline electrification work covers the 68 km of double track between Alcazar de San Juan and Santa Cruz de Mudela, completing the electrification of the 400 km between Alcazar and Córdoba, Spain's longest electrified line. Electrified at 3000 volts DC, the line will be worked by Bo-Bo-Bo locomotives of 3000 hp built by Westinghouse Electric Corporation in collaboration with Sociedad Española de Construcción Naval.

The electrification is part of an overall program for modernization of lines serving Andalusia, which also includes track rebuilding between Madrid, Sevilla and Cadiz, and CTC installations in the Linares-Lora del Rio and Sevilla-Cadiz sections.

Another important CTC project was completed on 29 November 1960, with inauguration of CTC between Vega Magaz and Leon, completing the Ponferrada-Leon section, 177 km wholly controlled by CTC.

▲ GESTESA trainsets built in Spain to Swiss design serve suburban passengers; electrification of Alcazar-Cordoba line was recently finished.

Rames GESTESA, projet Suisse, construites en Espagne pour desservir les faubourgs. L'électrification Alcazar-Cordoba est achevée.

GESTESA, schweizer-spanische Triebwagen für Vorortverkehr; Elektrifizierung Alcazar-Cordoba-Strecke wurde kürzlich beendet.

Ramas GESTESA construidas en España, diseño suizo, para lineas de cercanias; recientemente la electrificación de la linea Alcazar-Córdoba fué terminada.

New CTC went into service at Sevilla and on Ponferrada-Leon line.
CTC mise en service à Séville et sur la ligne Ponferrada-Leon.
Einsatz CTC nach Sevilla und auf der Strecke Ponferrada-Leon.
Nuevo CTC sirve en Sevilla y la linea Ponferrado-Leon.

Progress

Le progrès ferroviaire espagnol

Projets récemment réalisés comprenant nouvelles rames pour lignes électrifiées de banlieu, électrification des lignes principales en Andalusie et extension de la direction centralisée du trafic pour lignes intensives; (programme à achever en 1962).

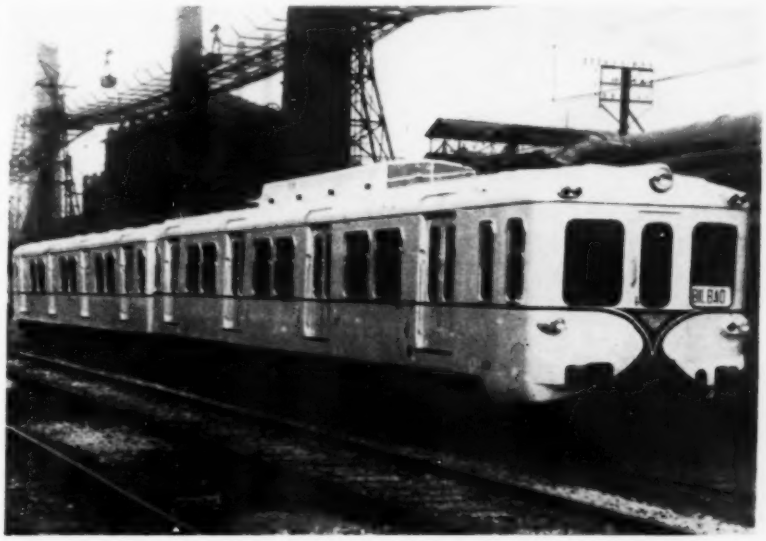
Spanischer Eisenbahn-Fortschritt

Kürzlich beendete Arbeiten im Rahmen des spanischen Erneuerungsprogramms plus neuer Vorortzüge für elektrifizierte Strecken; Hauptstrecken-Elektrifizierung in Andalusien und grössere Zentralverkehrskontrolle auf Strecken mit hoher Reisefrequenz.

Progresos de los ferrocarriles españoles

Hace poco han sido terminados los siguientes proyectos de modernización: nuevas ramas eléctricas para lineas de cercanias, electrificación de lineas principales en Andalucia, extensión de CTC. En 1962 el programa será llevado a cabo.

▲ Bo-Bo-Bo unit on main line; electric set on Bilbao-Portugalete run.
Bo-Bo-Bo pour ligne principale; automotrices Bilbao-Portugalete.
Bo-Bo-Bo Lokomotiven für Hauptstrecke; Elektrische Züge im Lokalverkehr.
Bo-Bo-Bo en linea principal; ramas eléctricas en recorrido Bilbao-Portugalete.



Thailand: State Railway Maps

Plan sexennal pour les chemins de fer thaï

Reflétant le point de vue que "Le chemin de fer a été et sera encore la colonne vertébrale du transport endéans le pays", la Thaïlande a entamé un programme sexennal pour la modernisation et l'amélioration de son système ferroviaire. Coûtant 1096 millions de Baht, le programme ajoutera 50 locomotives diesel de 100 CV, 1510 nouveaux wagons de types différents, installation moderne de triage pour une meilleure utilisation de l'outillage.

Sechsjahresplan für Thailands Eisenbahn

Davon ausgehend, dass "die Eisenbahn das Rückgrat des Beförderungswesens innerhalb des Landes gewesen ist und sein wird", hat Thailand einen Sechsjahresplan für die Erneuerung und Verbesserung seines Eisenbahnsystems aufgestellt. Das Programm hat die Anschaffung von 50 Dieselloks, 1000 PS, 1510 neuen Güterwagen verschiedener Klassen, sowie den Ausbau zeitentsprechender Rangieranlagen, zur besseren Nutzbarmachung des Materials, vorgesehen.

Programa de seis años para los ferrocarriles Tailandia

Adhiriéndose a la opinión de que la vía férrea es la base de toda transportación del país, Tailandia se ha embarcado en un programa de seis años para la modernización y el mejoramiento de sus ferrocarriles. El programa atiende a la compra de 50 locomotoras diesel, cada una de 1000 CV, 1510 carros de carga de varios tipos y la modernización de instalaciones de patio de clasificación para intensificar la utilización de equipos.

Thailand, a nation proud of its six centuries of independence, is proud, too, of its railway system. That pride is expressed in a comprehensive six-year modernization and investment program recently presented to the government by the State Railway of Thailand.

Behind the proposal, which will cost an estimated 1096 million Baht (approximately $52 million US), lie nine years of successful and profitable operation as an autonomous government organization, and the successful completion of a five-year improvement program that closed in 1960.

This "Top Priority" program saw the purchase of five Hitachi-MAN diesel electrics of 950 hp, with an additional 25 on order for 1961 delivery. More than 800 freight cars, approximately 150 passenger cars including the line's first three air-conditioned cars, and three self-propelled diesel trainsets were purchased under the program. The replacement of ABC couplers with automatic couplers of the MCB type was completed on all the line's 811 passenger cars and is well under way on the freight car fleet; 2750 out of 7057 cars are now so fitted.

A telecommunications network, cov-

Diesels are replacing steam power in Thailand; six-year plan will add 55 new units.

Diesel remplace la vapeur au Thaïlande; le plan de six ans prévoit 55 locomotives.

Diesel ersetzen Dampfloks in Thailand; Sechsjahresplan hat 55 neue Maschinen vorgesehen.

Dieselización en Tailandia; programa de 6 años; compra de 55 locomotoras.

Six-Year Investment Program

ering the entire system, was established providing traffic control and carrier telephone and telegraph between all stations; to cope with the 70-letter Thai alphabet six-unit code type teleprinters are employed, and are capable of handling transmissions in both Thai and English.

Work was begun to replace over-age 25 kg/m rail with 35 kg/m steel, and 900 km of rail, pre-welded at the Bangkok shops, were installed.

It is against this background, and with the prospect of steadily-increasing railway traffic requirements, that the present six-year plan was prepared.

The Thai railway system—3494 route-km of meter-gauge line—has experienced a steady growth of traffic during the past decade, and a continued increase of four to five per cent annually is anticipated—an additional 150,000 tons each year.

Meeting this increased demand is a primary goal of the new plan. During the next ten years, for example, rice production—a vital factor in the Thai economy—is expected to increase by 600,000 tons; with the completion of the Yanhee Dam in 1963, about half the total area of Thailand will have cheap hydro-electric power available, which is expected to encourage local industry; new lignite mines and cement and fertilizer factories will produce an additional increase in traffic.

To meet this anticipated need, the State Railway's program—which has been presented to the National Economic Development Board for incorporation into the national economic plan for 1961 to 1966—has been developed as an integrated proposal including 18 closely-related projects.

Project number one under the program is the purchase of 50 1000-hp diesel road locomotives, at a total cost of 225 million Baht. Part of the planned addition to the diesel roster—25 units—will be used to replace outdated steam locomotives now in use.

Replacement of steam power, as in other countries, is regarded as of prime importance in Thailand. Thai railway engineers calculate that 25 1000-hp diesels, operating an annual 2,859,000 train-km, will have total operating costs of 9,774,000 Baht, compared with 19,123,000 Baht for the 50 steam loco-

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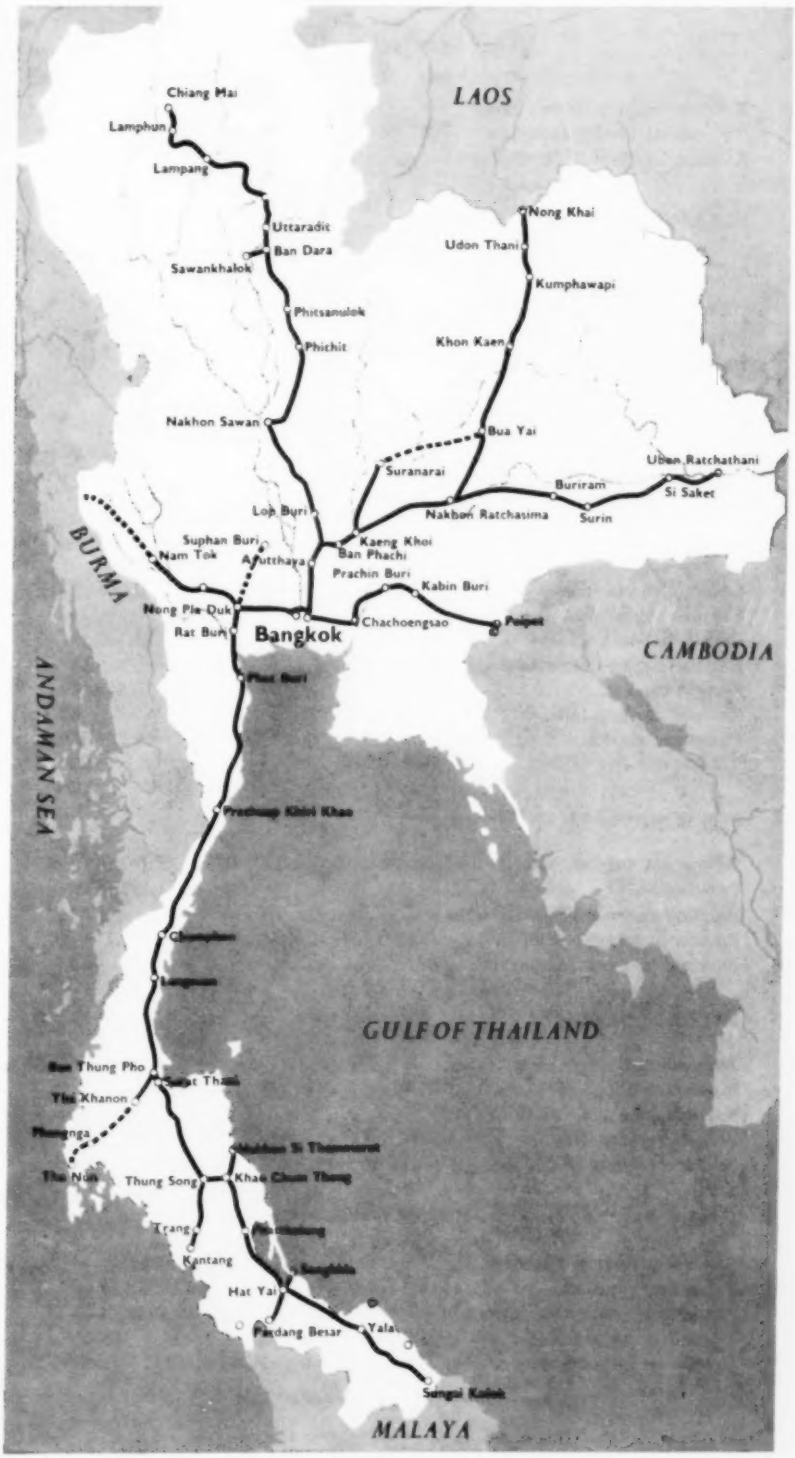


Railway Plan Will Add 55 Diesels, 1510 New Freight Cars to Meet

State Railway of Thailand

Vital Statistics, 1959

Route-kilometers, meter gauge	3494
Net capital investment (Baht)	4,621,895,574
Average number of employees	20,145
ROLLING STOCK:	
Locomotives in service	373
Steam	308
Diesel	65
Freight cars	7057
Passenger cars	811
OPERATIONS:	
Train-kilometers operated	16,610,257
Passenger	3,916,751
Freight	5,689,975
Mixed	5,743,715
Non-revenue	1,259,816
Locomotive-km, diesel	6,403,571
Km per engine day, diesel	292
Locomotive-km, steam	13,483,199
Km per engine-day, steam (Dec.)	137
Freight car-km	220,444,100
Km per car-day (Dec.)	82
Passenger car-km	60,251,359
Km per car-day (Dec.)	270
PASSENGER SERVICE:	
Passengers carried	35,990,185
Passenger-km	2,052,353,553
Average distance of travel (km)	57.11
Passenger revenue (Baht)	246,305,289
Average rev. per passenger	6.84
FREIGHT SERVICE:	
Tons carried	3,642,086
Revenue ton-km	1,072,568,630
Average haul per ton (km)	352.66
Freight revenue (Baht)	247,684,539
Average revenue per ton	60.30
FINANCIAL:	
Operating revenue (Baht)	517,926,547
Operating expenses	447,818,533
Net railway operating income	69,467,854
Operating ratio	86.46%
Return on investment	1.63%

Source: "RSR Information Booklet," 1960

motives required for the same service. In spite of the diesels' higher depreciation, annual savings are estimated at 6,748,000 Baht, equivalent to $625,000 US.

Dieselization of the Thai railway system will have added importance because of the growing shortage of forest lands in the country. The 260 steam locomotives that will remain in service following delivery of 25 diesels under the 1955–60 improvement program will require a firewood supply of one million cubic meters per year, requiring the destruction of 202 km² of woodland annually. With the destruction of woodlands already a matter of grave national concern, the elimination of steam power takes on added urgency.

In addition to the elimination of 50 steam locomotives now in service, the 50-diesel project envisions the use of 25 diesels to handle four new trains—three freight and one express—to accommodate completely new traffic.

Also envisioned in the six-year program is the establishment of a modern diesel maintenance shop at Bangsue yard. Scheduled to begin in 1966, the new facilities will cost approximately 20 million Baht. Meanwhile, however, the plan calls for the conversion of part of the present steam locomotive facilities at Bangkok for diesel maintenance in 1961, and for the establishment of a training center at an estimated cost over the six-year period of 15,840,000 Baht. Also included in the program are additions to the diesel repair shop at Makasan, including a wheel-truing machine which will permit accurate profiling of wheel treads and flanges without removing wheel sets from the locomotive.

Another major item in the modernization program is the planned purchase of 1510 new freight cars of various types. Of this number, 600 will be required to replace over-age or wornout equipment at an annual rate of 100 cars; the 150 additional cars to be acquired each year will be used to meet increased traffic demands, producing an anticipated 8.5 million Baht in additional freight revenue.

Although the new cars will carry the bulk of the additional traffic, the railway will not rely exclusively on new equipment to meet the demand. While anticipated traffic increases will theoretically require 200 additional cars per year, 50 "new cars" are to be made available each year by improving the utilization of present rolling stock.

Freight Increase of 150,000 Tons Annually in Growing Economy

A major contribution to increased utilization will be made by remodeling of yards at Bangsue, Menam, Haadyai, Tungsong, Nakorn Sawan and Utaradit. The tremendous increase in traffic experienced since these yards were built has led to extreme congestion and delay. Altogether, the improvement of utilization made possible by this 112-million Baht investment is expected to produce an annual increase in revenue of 3.6 million Baht.

The program includes 10 million Baht for the purchase of 5 diesel shunting locomotives. In addition to improving yard efficiency, each diesel shunter will save 58 thousand Baht in annual operating expenses.

Major permanent-way investments under the program will consist primarily of a continuation of work begun under the "Top Priority" investment program of 1955–60. Congestion and delay to train operations will be reduced by the extension or construction of 500-meter passing sidings at 146 stations (compared with 96 sidings in the previous program).

Increased speed and axle loading will result from the purchase of 53,900 tons of 35 kg/m rail and 250 turnouts for the replacement of 25 kg/m rail on 617 km of the railway's Southern line, where the majority of the rail now in service is over 40 years old.

In addition to the installation of heavier rail, the program calls for the replacement of timber bridges with steel, and the replacement or strengthening of existing steel bridges, to make possible an increase of maximum axle load from 10.5 tons to 15 tons. Altogether 348 bridges are included in the six-year project, and the total estimated cost will be 121 million Baht.

For improvement of operations, 54 stations will be equipped with signaling and interlocking installations, and tokenless block instruments will be installed at 46 stations to reduce time lost by handing and receiving tokens.

To improve maintenance-of-way-work, 12 million Baht have been allocated in the

CONTINUED ON PAGE 60

STATE RAILWAY OF THAILAND: 1961-66 INVESTMENT PROGRAM

Item	Foreign Exchange (US Dollars)	Local Expenditures (Baht)	Total Baht	Total Dollars
50 1000-hp diesel road locomotives	10,000,000	15,000,000	225,000,000	10,714,500
1510 freight cars	6,931,000	11,849,000	157,400,000	7,495,388
5 diesel shunting locomotives	445,000	655,000	10,000,000	476,200
Modernization and rebuilding of 11 major yards	—	122,000,000	122,000,000	5,809,648
Construction and extension of 146 500-meter sidings	—	16,711,000	16,711,000	795,780
Replace 25 kg/m rail with 35 kg/m rail and switches on 617 km of line	9,405,000	36,848,000	234,350,000	11,159,747
Replace or rebuild 348 bridges for 15-ton axle loads	3,100,000	56,034,000	121,134,000	5,768,401
Signaling and interlocking equipment for 54 stations	350,000	1,650,000	9,000,000	428,580
Telecommunications installations	120,000	1,278,000	3,798,000	180,860
Replace 54 station buildings, 90 new station buildings, and other office buildings	—	30,940,000	30,940,000	1,473,362
Housing for personnel	—	48,000,000	48,000,000	2,285,760
Impregnation plant for wood sleepers	100,000	5,900,000	8,000,000	380,960
Mechanized permanent-way maintenance equipment	500,000	1,500,000	12,000,000	571,440
Extension and alteration of permanent-way department shop	180,000	3,720,000	7,500,000	357,150
Tokenless block installations at 46 stations	30,000	1,670,000	2,300,000	109,526
Machinery for equipment shops	294,000	962,000	7,100,000	338,102
Level-crossing barriers	—	1,200,000	1,200,000	57,144
Training center	—	15,840,000	15,840,000	754,300
Miscellaneous investment	—	30,000,000	30,000,000	1,428,600
Total	31,455,000	401,718,000	1,062,273,000	50,585,440
Contingencies	910,000	15,448,000	34,558,000	1,645,651
Grand Total	32,365,000	417,166,000	1,096,831,000	52,231,091

How to Get

PLANNING FOR MICROWAVE

Microwave — beamed radio using ultra-high frequencies — has generated a high degree of interest on the part of railway communications officers throughout the world. In the past decade, a number of installations have been made on railway systems.

While their total length remains relatively infinitesimal, the use of microwave seems sure to grow, both as a replacement for existing pole-line and cable communications and as an initial system for newly-built railways.

How does the railway communications officer plan for microwave's introduction? What are some of the technical and economic considerations which must be dealt with?

In a recent report to the Communications Section of the Association of American Railroads, a committee headed by R. C. Karvwatt of the New York Central System discussed some of these questions.

Advantages and Disadvantages

According to these railway officers, microwave has at least six factors working in its favor. They include all-weather dependability, lack of interference from outside sources or atmospheric conditions, improved quality of the transmitted signal, inherently high capacity, and concentrated maintenance. There are supplemental benefits, too, such as increased coverage for VHF radio through use of the high microwave towers.

In contrast, there are also certain disadvantages to railway use of microwave. These, principally, are the difficulty of providing direct service to local offices, pole boxes, booths or signal equipment, and the fact that specialized test equipment is required for maintenance of the system including the antennas.

The first of these disadvantages is not insurmountable. Where the problem arises in the US and Canada, the practice

Typical installation using low-level parabolic antenna and elevated passive reflector.

Installation utilisant antenne parabolique à niveau bas et réflecteur passif élevé.

Typische Anlage benutzt kleine Parabolantenne und hoch gelegenen Umlenkspiegel.

Instalación típica con antena parabólica de bajo nivel y reflector pasivo elevado.

et Ready for Railway Microwave

has been to use short sections of wire to serve local points. In mountainous terrain, where it is sometimes difficult to reach a desired drop-out point directly from the microwave trunk, either a microwave spur or a wire line can be installed from the microwave station to the drop-out point.

The advantages of microwave, on the other hand, are impressive on several counts.

In the matter of inherent capacity, for example, an existing microwave system can be expanded at low cost merely by increasing the band width of the radio equipment. The capacity of present microwave systems in the US ranges from 120 to 240 channels—in contrast to the maximum 16-channel capacity of most wire lines.

Two other advantages of microwave warrant added mention— concentration of maintenance work at fewer locations and transmission quality.

Maintenance of a microwave system can be handled at a limited number of locations, or stations, rather than dispersed over an entire railway as is the case with wire lines. This tends to save time for the maintenance force, allowing it to locate and correct trouble promptly. Pinpointing such trouble, should it arise, can be facilitated by built-in supervisory and alarm facilities. Necessary maintenance can be regularly scheduled with greater confidence than in the case of wire lines.

Most of the factors that work to give a microwave system dependability—it is less affected by adverse weather conditions, for example—also affect transmission quality.

Microwave has inherently greater band width and smooth frequency response; and this, together with its freedom from external effects, results in a higher-quality signal. The transmission path of a microwave system is unaffected by cross-talk or distortion in a voice channel. By comparison, a wire line system is susceptible to both because of changes in line characteristics.

Costs to Consider

Turning to the second of the three basic questions, the matter of cost, railways in the US and Canada have encountered complications in seeking answers. These arise, in almost every instance, from the

CONTINUED

Etudes d'application de la micro-onde

La micro-onde—radio directionnelle utilisant des fréquences ultra-hautes—a suscité le plus vif intérêt chez les directeurs des communications ferroviaires à travers le monde. Ces dernières dix années un nombre d'installations ont été placées aux chemins de fer. Tandis que leur longueur totale reste infinitésimale, l'emploi de la micro-onde semble s'accroitre, tant comme remplacement de la ligne à poteaux actuelle et les communications par cable, que comme système de début pour des chemins de fer nouvellement construits. Comment le directeur des communications ferroviaires se propose-t-il d'introduire la micro-onde? Quelles sont quelques unes des considérations techniques et économiques auxquelles on aura à faire? Comment son prix se comparera-t-il avec ceux des communications conventionnelles? Dans un rapport récent à la Section des Communications des Chemins de Fer américains, un comité présidé par R. C. Karvwatt du Chemin de Fer New York Central, a discuté quelques unes de ces questions.

Richtfunkplanung

Richtfunk—Hochfrequenzenergie erforderlich—findet in aller Welt vor allem grosses Interesse bei Eisenbahn-Fernmeldestellen. Im letzten Dezennium wurden verschiedene dieser Anlagen den Eisenbahnsystemen zugefügt. Obwohl ihre Gesamtlänge verhältnismässig klein bleibt, scheint die Verwendung von Richtfunk ständig zuzunehmen und zwar nicht nur als Ersatz für bereits vorhandene Pollinien und Kabelmeldungen sondern bei neuen Eisenbahnen gleich als erstes Fernmeldesystem. Wie wird die Einführung des Richtfunkes von dem Eisenbahn-Fernmeldedienst geplant? Und welche technischen und wirtschaftlichen Erwägungen müssen hierbei berücksichtigt werden? Wieviel wird der Richtfunk im Vergleich zum konventionellen Fernmeldesystem kosten? In einem Exposé, das kürzlich der Fernmeldeabteilung des Verbandes Amerikanischer Eisenbahnen vorgelegt wurde, behandelte ein Komitee, unter Vorsitz des Herrn R. C. Karvwatt von dem New York Central System, einige dieser Fragen.

Estudio de la aplicación del sistema microonda

Microonda—radioemisión que utiliza frecuencias ultraaltas—ha despertado mucho interés por parte de los funcionarios ferroviarios que se ocupan de la comunicaciones. En los últimos diez años algunas de tales instalaciones han sido puesto en servicio en sistemas ferroviarios. Aunque la extensión total queda relativamente infinitesimal, parece que la aplicación del sistema microonda se aumentará, tanto para reemplazar la línea de postes y empalmes de cable, como un sistema inicial para nuevas líneas férreas ¿Cómo proyecta el functionario de las comunicaciones ferroviarias la introducción del sistema microonda? ¿Qué son los problemas técnicos y económicos con los que tiene que enfrentarse? Qué es el resultado de una comparación del costo con aquél de las comunicaciones tradicionales? En un informe presentado recientemente a la Sección de Comunicaciones de la Asociación de Ferrocarriles norteamericanos una comisión presidida por el Sr. R. C. Karvwatt del New York Central System trataba algunos de estos asuntos.

Microwave Is Essentially Free from External Effects—

fact that these railways have extensive wire plants already installed and in service. For this reason, most microwave installations to date have been on either new segments of rail line, or in particularly busy areas on the larger railways.

Actually, to obtain a fair cost comparison between the two systems—microwave and open-wire and cable systems—it is necessary to begin anew, as though neither existed presently.

In this context, certain costs common to any system of equal length and capacity can be eliminated—operation of the terminal equipment (to the extent that it is identical), for example.

From this point forward, however, differences arise. A multiplex microwave system's cost will include the terminal carrier multiplex system, the intermediate relay stations, including towers and antennas, terminal radio stations, power equipment, etc., none of which is required for an open wire system. There are also the costs of land, buildings and access roads, as well as accessory items such as fences around stations.

The initial cost of an open wire system, on the other hand, should include line survey costs, cost of right-of-way for the pole route, cost of poles, cost of wire and fittings and the labor on each of these items.

For a cable carrier system, cost estimates must embrace the line survey expense, right-of-way costs, cable trench opening and closing, and cable laying and man-holes if the line is underground, or poles, erection and installation if the cable is of the aerial type. The cost of repeater stations, loading cases and repeater equipment must be considered, also.

Beyond the varying costs for installation, there is the factor of comparative operating costs. A system with a low initial cost may have a higher annual expense for operation and maintenance, thus offsetting the initial benefit. In fact, in the case of microwave, the initial cost often can be trimmed through the salvage of equipment which microwave displaces. That possibility should not be overlooked.

To obtain the true annual operating costs of any given system, it is necessary to consider the interest on invested capital where applicable and depreciation, both in addition to maintenance. Nor should taxes be ignored in estimating annual operating charges.

Calculations which have been made on railways in the US have shown as a general rule that microwave installation costs are lower than wire line in cases where the addition of a large number of new channels is required. For smaller numbers of channels, particularly where transposition of existing wires is not required, the installation cost of the wire plant is generally less.

Engineering Factors

As to engineering considerations in planning a microwave system, it is necessary, first of all, to determine circuit requirements carefully, as well as plan for calculated expansion. Once a circuit layout has been determined, microwave terminals or repeater stations should be planned as close to the major drop-out points as possible. Local terrain features must be considered. Propagation requirements and intermediate terrain features will then indicate possible locations for other required repeaters.

A simple line diagram of the proposed system should be prepared as a next step, showing as much detail as possible. It should indicate for each circuit the type of service, termination at each end, type of signaling required, and special considerations such as an alarm and supervisory channel.

The alarm and supervisory channel is normally used by maintenance and supervisory personnel. In addition, it can automatically report to a central point a number of alarm conditions: failure of commercial power, radio frequency, tower lights or almost anything else necessary to report. Corrective measures can be taken without delay. This special channel must be dropped out at each repeater station, and be provided with selective calling or ringing to all other points on the system.

The alarm/supervisory channel is a side issue, however, to the principal job of the microwave installation. Trunk voice channels are more basic. These are normally two wire drops at each end of the system, connected to switchboards. These drops are provided with 20-cycle ringdown, if used between manual switchboards, or E&M signaling if used between automatic switchboards. Signaling as provided on the microwave must also work properly into and out of the carrier.

For local voice channels, it may be necessary to extend beyond the microwave terminal, or pick up local way stations and pole boxes at intermediate points between repeater stations. Such service may be dictated by the needs of train dispatchers. At these local points care must be used to insure that connection of the physical pair to the microwave does not reduce transmission levels appreciably due to bridging losses. Proper applique units must be provided at such points, also, to transfer selective ringing from the microwave to the physical, and to permit transfer of 20-cycle ringing in the case of conversation circuits, from the physical to the microwave.

Trunk printer or Morse circuits may be placed together within a voice channel or a number of voice channels; or the channels can be capable of being operated as speech-plus-duplex for possible extension over open wire line along with the associated voice channel to outlying points. These circuits may be either half or full duplex, as required, and should be capable of being extended over carriers or standard duplex equipment.

Channels

Microwave channels assigned to CTC and signaling normally consist of a voice channel with one or more duplex channels. If three channels or less of duplex are required, they can be obtained through speech-plus-duplex if the signaling voice channel is of adequate width; but if more channels of duplex are required, a separate voice channel will be required for the signaling. This circuit requires special consideration to be sure that both the voice and duplex circuits are terminated properly, and that adequate equipment is provided to insure reliable operation.

Channels for special service may be required for data transmission, facsimile, closed circuit TV, etc. Such possible applications should be reviewed thoroughly to determine their feasibility, and whether the base band to be provided by the microwave can handle the wide band widths proposed with the degree of reliability demanded for those types of service.

Once the circuit planning is completed, attention must then be given to the geographical location of the various radio terminals and repeater stations.

Microwave radio energy travels in

Provides High-Quality Signal, Smooth Frequency Response

virtually straight lines; the radio waves are focused into narrow beams by the antenna systems. Under ordinary conditions the distance between stations will be limited to the line of sight. The energy beam, analogous to a beam of light, is subject to obstruction or attenuation by solid objects, reflection from flat surfaces, diffraction around the edges of solid objects, and refraction or bending by the atmosphere.

Unlike cable and wire systems, where propagation losses are always constant, a microwave system is subject to continuing variations in received signal level. For this reason, four propagation factors should be analyzed carefully—free space attenuation, fading, weather effects and reflection.

Path Clearance

Microwave propagation path surveys provide information for preliminary cost estimates of the microwave system, along with information about its reliability. A paper survey can be made to determine the number of repeater stations and approximate tower heights. A final field survey will assure reliable microwave propagation between all stations and establish exact site locations.

This field survey must establish a clear line-of-sight transmission pattern, allowing for adequate clearance above any intermediate obstructions. Once this is done, a topographical profile chart should be prepared for each path to show the elevation of all important points, such as hills, ridges, buildings, trees and other obstacles which might interfere with line-of-sight transmission.

Three methods can be used to determine path clearance: optical sighting, altimetry or aerial surveying.

The clearance of a path can often be verified by visual sighting from one end to the other with a pair of field glasses or a telescope. Greater accuracy can be obtained by using a transit. When it is not possible to sight directly with optical instruments, clearance may be checked during the day through use of a flashing mirror, or, at night, through use of lights. These imprecise methods should be supplemented by checking the altitude of prominent features by an altimeter.

Altimeters used in path survey work should be of a precision surveying type. Accuracies in the order of five feet can be obtained through use of these instruments. Two altimeters should be used, both instruments adjusted to the known elevation at a bench mark location. One altimeter should remain at this point, and the other taken to the point to be measured. Temperature and elevation readings should be recorded at each point.

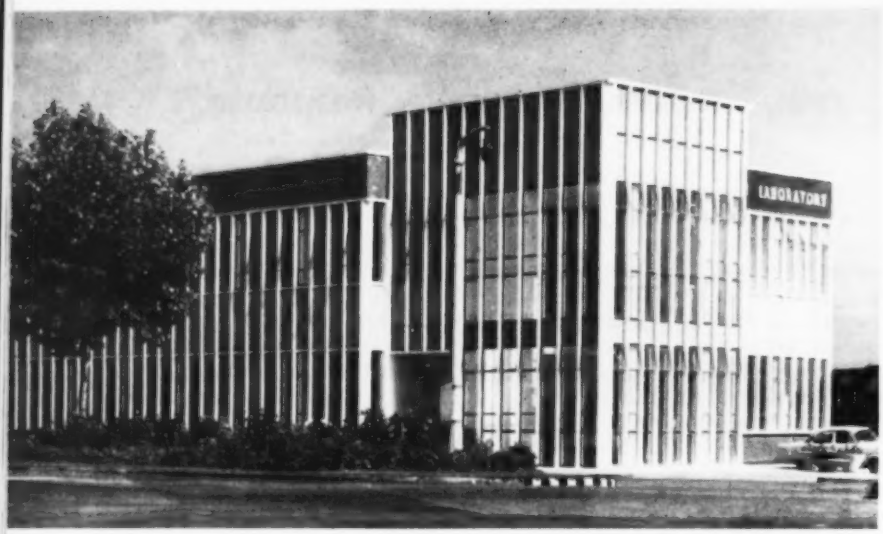
The aerial methods include running profiles by radar surveying from the air and taking stereoscopic photographs of the area being surveyed. Both methods are accurate but expensive.

The field survey should not be limited to the attaining of information solely for plotting profiles and detailing path clearances. It should include the collection of all information necessary to evaluate the merits of each site, and to plan site development when the final choice has been made. To achieve this purpose, information should be obtained concerning accessibility, power availability, soil conditions, site obstructions, availability and cost of land, existing structures, availability of suitable alternate locations, zoning regulations, airports and unusual weather conditions.

Finally, consideration should be given to the microwave equipment, including provisions for standby equipment, antenna systems, towers, power, electrical protection, housing, fencing and terminal and distribution facilities.

Repeater installation with "dish" antenna.
Installation répéteur, antenne "soucoupe."
Verstärkeranlage mit Parabolantenne.
Instalación repetidora con antena tipo "dish."

Laboratory



Scientific research has played an increasing role in railway operations throughout the world in recent years—in materials and purchasing control, in day-to-day operations, and in the development of new processes and materials. Officially opened during December, London Transport Executive's new laboratory at Chiswick will provide improved research facilities for one of the world's largest and busiest metropolitan transport organizations.

Representing a consolidation and expansion of research operations carried out in the past by LTE, the Chiswick laboratory has been specifically designed to accommodate an unusually wide range of research activities in all areas of rail and road mass transport.

Among the laboratory's functions are quality control for LTE's routine purchases—some £15 million in supplies annually; technical control and assistance in various phases of workshop operations; and special research in such widely varied fields as metals, lubricants, paints, and textiles.

The fundamental operations of the laboratory are carried out by five main sections and one sub-section—physics and engineering; metallurgy; fuels and lubricants; paints; and general chemistry (including the textiles laboratory).

Physics and Engineering Section

The section is concerned primarily with studies of the mechanical and electrical properties of non-metallic materials, development of test methods; and both field and laboratory testing of equipment performance.

Electrical research of various kinds is an important function of the section. Electrical insulation testing and research are facilitated by the provision of high-voltage test equipment providing adjustable voltage up to 50 kv for breakdown tests of all kinds of insulating materials, including insulating oils. Facilities are provided for photometric testing of lamps, and for accelerated life tests of lamps under varying conditions. Research on storage-battery performance is also carried out, and facilities are provided for charge and discharge tests at both normal and high rates as well as cycling and overcharge life tests. It is expected that the battery test facilities will eventually enable studies to be carried out in less time than present service-test methods.

Develops Test Equipment

The section contains a cold chamber producing controlled temperatures down to approximately —18° C. The chamber, measuring 14.3 × 2.76 × 2.46 meters, will be of particular value in studying the cold-weather behavior of cooling, heating and compressed air equipment, and in the development of improved conductor-rail de-icing methods.

Another of the section's important functions is the development of testing equipment of various kinds, both for other sections of the laboratory and for engineering and equipment departments of the LTE organization. A separate laboratory has been provided for the construction and calibration of instrumentation equipment, with special attention being devoted to the development of special electronic equipment and the adaptation of commercial equipment for the instrumentation of engineering studies. Special equipment includes noise measuring and analysis apparatus and a twelve-channel ultra-violet recording galvanometer and associated equipment particularly suited to simultaneous recording of strain-gauge signals. As much testing must be carried out along the right-of-way or in vehicles where electrical mains are not available, battery power is employed wherever possible, and the section is making increasing use of transistorized equipment to reduce current consumption.

Axle Testing

Currently one of the section's primary projects is the study of axle stresses in rail equipment. The subject is being approached in a twofold manner—through instrumented tests under in-service conditions and in laboratory situations.

For in-service testing a District Line car has been fitted with strain gauges and slip rings on a motored axle, and studies are being made of bending stress on straight and curved track, turnouts and crossovers.

A major part in this research is played by a new axle-fatigue testing machine developed by Nottingham University under contract and installed in the new laboratory. Aspects of fatigue to be studied include initially the effects on fatigue strength of surface rolling, with and without light machining; later the effect of shrink fits and the influence of steel composition will be studied.

The machine is of the resonant type with mechanical drive from a 25-hp DC motor below floor level, with current supplied from a Ward-Leonard set to provide variable speed control.

Specimens of about 1500-mm length and with a diameter typical of axles in service (165 mm) are mounted between two heavy discs. The entire assembly has a natural frequency for transverse bending of just under 50 cps, and is freely suspended from the center of the upper disc by a wire rope. The lower disc has a rigid extension tube, which is engaged by an eccentric stub shaft driven by the motor, with the eccentricity being adjustable to produce varying degrees of stress. Driven at a speed corresponding to the natural frequency of the assembly, the machine produces vibration and a consequent rotating bending stress on the specimen. A special hydraulically-operated clutch prevents excessive stresses being applied during starting and stopping of the motor, when the speed does not

For Mass-Transport Research

coincide with the resonant frequency. Stresses on the specimen are measured by resistance strain gauges, and protective devices are incorporated so that the machine may be left running unattended.

After failure during the testing, specimens are broken open by static bending to expose fatigue-fractured surfaces for study.

A related study is being carried out at Nottingham University, dealing with residual stress distributions in cold-rolled railway axle wheel seats; of common interest to both LTE and the British Railways, this investigation is being sponsored by the British Transport Commission's Research Coordination Committee.

Fuels and Lubricants Section

This section is concerned with fuels, all types of lubricants, transformer oils, and allied petroleum-based products. Fuel research is primarily concerned with LTE's road operations, but lubricants research covers every field of activity from generating plants to delicate clocks and instruments, and covers a correspondingly wide range of lubricants: plain and additive treated oils of many kinds; many categories of grease products incorporating solid lubricants; bonded

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Centre de Recherche pour le Transport

La recherche scientifique joue un rôle de plus en plus important dans la planification et l'opération des Chemins de Fer en contribuant d'importantes économies dans l'opération journalière. Les nouveaux laboratoires remplacent graduellement les méthodes traditionnelles dans l'industrie ferroviaire. Inauguré en décembre 1960, le laboratoire à Chiswick de la regie London Transport Executive constitue une addition importante nouvelle aux facilités de recherches scientifiques ferroviaires et de transport en masse.

Massentransport-Versuchsanlagen

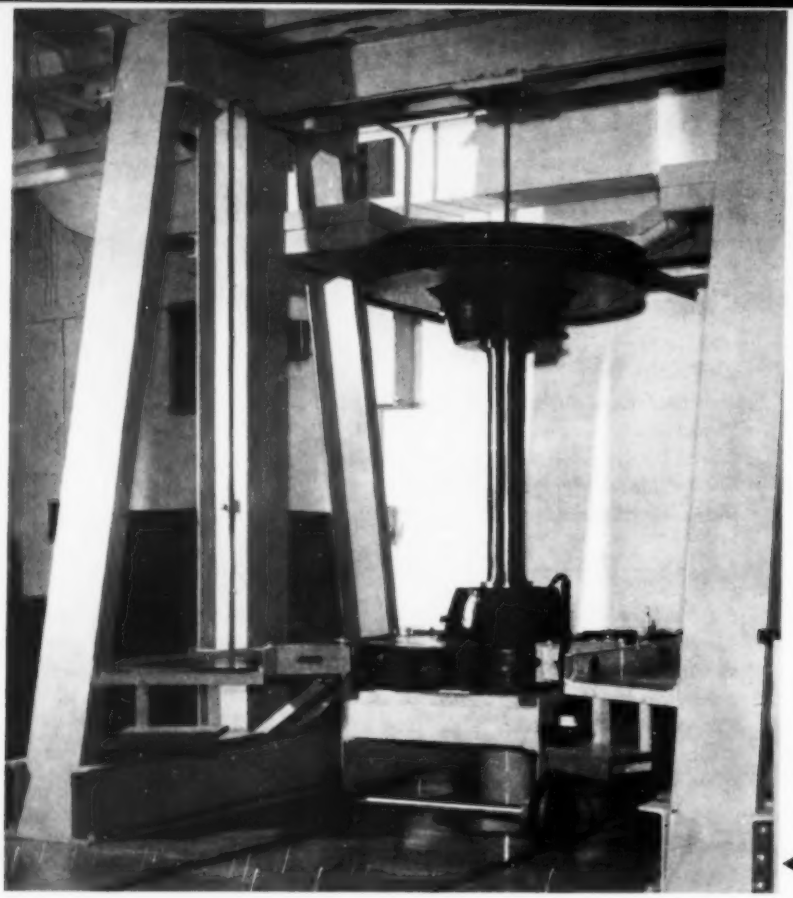
Gründliche, systematische Versuche spielen eine zunehmende Rolle bei Eisenbahn-Planungen und -Verkehr, die zu beträchtlichen Einsparungen im Betrieb und zu künftigen neuen Resultaten und Fortschritten beitragen. Die neuen Laboratorien haben allmählich viele der tradionellen Methoden in der Eisenbahnindustrie ersetzt. Ende 1960 eröffnet, wird das London Transport Executive's Chiswick- Laboratorium für die Eisenbahnwissenschaft und Massentransport-Versuchsanlagen von grosser Bedeutung sein.

Centro de investigaciones para transporte colectivo

La investigación científica juega un papel cada vez más importante en la planificación y las operaciones ferroviarias. Contribuye economías importantes, así como productos y procedimientos nuevos a la operación diaria. Los nuevos laboratorios substituyen más y más los métodos tradicionales en la industria ferroviaria. El laboratorio en Chiswick de la London Transport Executive es una adquisición importante para la investigación científica de operaciones ferroviarias.

Metallurgy section uses 260-kv unit for X-ray examinations.
Section métallurgique utilise appareil de 260-kv pour rayons X.
Röntgen-Untersuchungsgerät 260-kV, in der Abteilung Metallurgie.
Sección metalúrgica utiliza aparato de 260-kv para rayos X.

Penetrometer with automatic timer determines grease consistency.
Pénétromètre automatique établit la consistence de la graisse.
Penetrometer mit automatischem Zeitmesser bestimmt Schmierkonsistenz.
Penetrometro determina consistencia de lubricantes.



Special machine subjects axles to high bending stress; after failure axle is broken open for study of fracture.

Machine spéciale soumettant les essieux à une tension de voilement élevé; après la rupture la surface est étudiée.

Spezialmaschine unterwirft Achsen hohem Beugedruck; nach Versagen werden Achsen für Bruchuntersuchungen gebrochen.

Máquina sujeta ejes a ensayos de flexión; después del incidente el eje es analizado para estudiar la rotura.

TRANSIT LABORATORY CONTINUED

lubricant coatings; anti-friction surface-treating processes; and self-lubricating materials.

The section's basic functions include:

- Technical advice related to purchasing.
- Quality control of supplies.
- Advice on appropriate grades of material for specific applications, methods of use, etc.
- Investigation of day-to-day problems.
- Constant review of fuel and lubricant developments, and investigation of those of potential value to LTE.
- Long-term research looking toward increased efficiency through the use of improved materials and modified practices.

Equipment in use by the section includes basic apparatus for physical examination of fuels, lubricating oils and greases; a test engine for fuel studies; and chemical-analysis equipment including a flame photometer, spectrophotometers, and electrometric titration equipment. Air Ministry and Michie equipments for oxidation tests of lubricating oils is supplemented by the addition of a Shell "Procedure B" automatic oxidation apparatus.

For study of the mechanical properties of greases for traction motors, traction gears and axleboxes of railway equipment, as well as road-vehicle lubricants, the section has a Shell four-ball machine, a mechanical greaseworker, a rolling stability tester and a CRC wheel-bearing rig.

Paints Section

Concerned with paints and finishes used on both road and rail vehicles, as well as on structures, the Paints Section conducts research on both the materials themselves and preparation and application methods.

A paint chemistry laboratory employs two analysts, and the adjoining physical testing laboratory is provided with a high-speed centrifuge, photoelectric equipment for the measuring of gloss and opacity, a scratch hardness tester, and other testing equipment.

Center of the section's activity is the general applications laboratory, where systematic practical testing is carried out. Besides equipment for controlled application of finishes, the section has an accelerated weathering machine, fitted with four carbon arc lamps and jets for simulating rain and capable of accommodating 72 test panels 238 × 76 mm in size. Also used are a salt spray cabinet and humidity chamber for corrosion research and special equipment for testing the resistance to tobacco smoke of enamels used on the ceilings of passenger vehicles. Exposure racks located on the roof of an adjacent building can hold 348 specimen panels measuring 508 × 254 mm, and are carefully spaced to avoid shadowing. The routine outdoor exposure testing includes not only the actual exposure but the use of appropriate cleaning processes, etc., to duplicate actual operating conditions as closely as possible.

Metallurgical Section

For testing and analysis of ferrous and non-ferrous metals, the Chiswick laboratory maintains a metallurgical section charged with such matters as the recommendation of materials; advice on the avoidance of design features likely to result in fatigue during service; examination of failed components and recommendation of modifications to avoid

Equipment at London Transport Laboratory Aids Research

future failures; and technical advice on workshop procedures such as welding, electroplating and heat treatment. The section also conducts routine tests of purchased materials to assure compliance with specifications.

Many of the specimens dealt with are of considerable size, and a machine shop is available for the preparation of samples, sections for microscopic analysis, and test pieces for either miniature or full-scale mechanical testing.

Because of the wide variety of metals dealt with, classical chemical-analysis methods are used to a large degree, and the section maintains a chemical laboratory for analysis, as well as for related work such as control of electroplating solutions and the like. However, the provision of new facilities will permit greater use of physical analysis methods, and a small laboratory has been provided for spectrophotometric work, and modern electrolytic analysis equipment has also been provided.

For metallography the section has facilities for mounting, polishing and micro-etching, and a room equipped with a projection microscope, binocular microscope, stereoscopic microscope, and an X-ray film viewer.

For physical testing of specimens 12.5 and 30-ton tensile testing machines, an Izod impact tester, a Vickers hardness testing machine and a power-operated Brinell hardness tester are available, as well as a Hounsfield Tensometer.

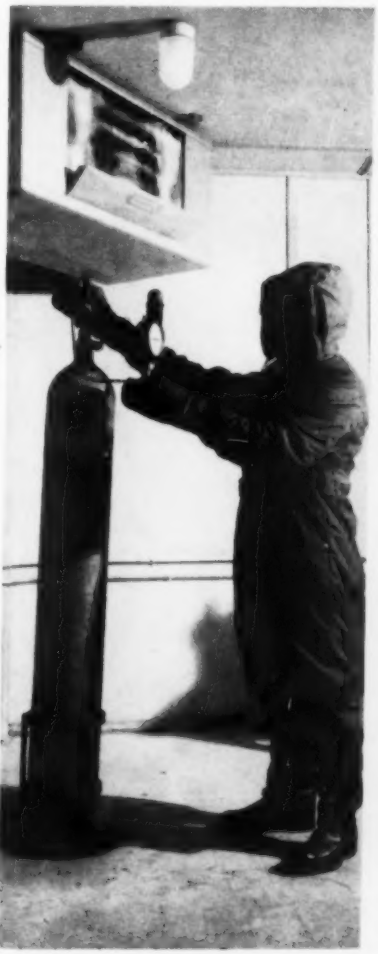
The new laboratory facilities have made possible the addition of radiographic equipment for metals examination, consisting of a suitably screened room measuring 6.1 × 5.5 × 4.3 meters, housing a 260-kv X-ray tank unit. While the room is of sufficient size for the examination of most items, the X-ray equipment is portable and can be used for on-site examinations where required.

The radiography room is also designed for gamma radiography if desired. Also added to the metallurgy section in the new quarters is a laboratory for heat-treatment trials and welding tests.

General Chemistry Section

While chemical analysis plays an important part in the work of all sections, much of the chemical work falls outside the scope of these specialized units, and the general chemistry section conducts tests and research on such varied materials as detergents, adhesives, inks, disinfectants, and weed-killers. The section conducts routine tests of solutions used in workshop processes. Among the investigations carried out in the past have been the indentification of leakage into underground tunnels, origin of fires, cleaning and corrosion research, and the like.

Administratively linked to the general chemistry section is the textiles subsection, charged with control of quality in uniform fabrics, canvas, upholstery, and other textiles, most of them purchased to specifications specially developed for London Transport needs; considerable attention is paid to new textile developments, especially in the area of man-made fibers, and a good deal of experimental work is carried out in their evaluation. The laboratories include one devoted to chemical and general examinations, dealing with such matters as flammability, waterproofing, and surface drag, and one for physical testing. The physical testing laboratory is equipped with strength and tensile testing machines and a projection microscope for the measurement of fiber diameter. Equipment for the accelerated testing of fading and color fastness includes a xenon discharge lamp producing light with a spectrum closely approaching that of natural sunlight; a daylight-exposure cabinet is also provided on the roof of an adjacent annex building.



Special equipment is used to analyze noise from magnetic-tape recordings in physics and engineering section; section uses large cold room for low-temperature tests.

Outillage spécial analyse bruits d'enregistrements à bande magnétique dans la section physique et mécanique; grande chambre frigorifiée pour essais à basse température.

Geräuschanalyse magnetischer Tonbandaufnahmen in der physikalischen und mechanischen Abteilung; für Versuche bei niedriger Temperatur werden grosse Kühlräume benutzt.

Se emplea equipo para analizar una cinta magnética en la sección de física y la oficina técnica; sección utiliza gran sala para ensayos en temperaturas bajas.

Soviet Minister

What is the status of the Soviet Union's much-talked-about automatic train? How does the USSR propose to apply atomic power to railway operations? What are the relative roles of dieselization and electrification in the expansion plans of Soviet railways? How does the USSR achieve its extremely high utilization of freight cars? In an exclusive interview granted to INTERNATIONAL RAILWAY JOURNAL, USSR Minister of Railways Boris Pavlovich Beshchev answered these and other questions relating to Russian railway operations. The accompanying text is a transcript of the interview.

Economic Efficiency

Q. Railways in the USSR have engaged in extensive rehabilitation and expansion since 1945. Does this reflect government policy that railways are the more economic means of transporting goods and passengers?

A. The reconstruction of our railroad transport takes place according to plan, in accordance with decisions of the party and the government. In our country, occupying one sixth of the land surface of the world, railroad transport is the basic mode of transport, on which is moved 83 per cent of all freight traffic. The cost of transport by railroad is significantly less than by highway transport.

Q. Is it the Soviet view that efficiency results from the regional set-up, or is there a trend toward fewer regions?

A. Consolidation of a number of railways and branch lines has recently been accomplished in our country. This gave positive results, from the standpoint of traffic organization and utilization of technical facilities, as well as reduction in operational expenditures.

Q. What measurement is used to determine the relative efficiency of the several regions in the USSR railway system?

A. Every railway has planned expenditures and receipts (the railroad sector being the basic economic unit) and this is the principal factor which determines the economic efficiency of the work of the railroad.

Q. In view of the heavy commuter traffic in Moscow and other cities, have studies of monorail been made?

A. The number of suburban trains increases at the Moscow terminal during "peak" hours, but we cope with the increase in the volume of suburban traffic because of broad application of new technology. As for the use of monorail, this is now under study.

Q. In the matter of rates which are levied by the railways, to what extent is cost-of-service a consideration in establishing the rate level on goods traffic? Also, what weight is assigned to the value-of-service from the standpoint of the national economy—that is, are some types of goods moved at less than railway cost as a contribution to the national welfare?

A. Tariffs for the transport of all freight by all modes of transport are established concurrently with the determination of wholesale prices (all USSR railroads use a single tariff). Tariff policy for the railroads provides for the elimination of irrational transport. For certain "national economy" freight, rates are lower than the cost of the transport. However, as a whole, transport is a profitable branch of the national economy and makes its contribution to the budget of our country.

Q. It has been reported that freight cars are utilized to a high degree in the USSR. Is this utilization obtained by close supervision at the local level, or does it merely reflect an accurate economic balance between industrial output and the total capacity of the railway car fleet?

A. The best utilization of means of transport results from our socialist planned system, which provides for proportional and harmonious development of all branches of the national economy, including railroad transport. In addition, maximum utilization of the freight-car fleet in the USSR is achieved by means of the most precise direction of all operational work.

Q. Piggyback—the haulage of highway vans on railway flat cars—and haulage in containers, is growing rapidly in many parts of the world. To what extent, if any, is piggyback used in the USSR? How widely are containers used?

Discusses USSR Rail Progress

A. Containers are widely used on the railroads of the USSR and their use is rapidly increasing. Piggyback trailer vans have not yet come into use, but the question is being seriously considered, especially the economics of their use under conditions in our country. This is because piggyback shipments require the use of specialized flat cars which are difficult to use for other shipments. Shipping in containers is increasing without interruption, and this increase is logically controlled, since we are converting to the construction of large capacity freight cars and containers are a basic type of carrier for small shipments. We build various containers, and the basic types have a capacity of 2.5 and 5 tons.

Q. In the event of interruption in passenger service, or if goods are damaged while in the hands of the railway, how are complaints registered with the railway, and what procedure is utilized to settle such matters?

A. There is a special document in the USSR, "Railroad Regulations," which stipulates the mutual responsibilities of the railroads, the shippers and the receivers. In the Ministry of Railroad Transport (MRS) a special commercial administration works on these problems. As for differences between customers and railroads, the final decision is submitted to arbitration.

Motive Power and Rolling Stock

Q. The USSR has extensive sections of electrified railway whereas other portions are powered by diesels. Is it anticipated that electrification will be extended into new areas?

A. Electrification in the USSR is carried out in accordance with the overall state plan for electrification of the entire country. Sections with the greatest freight traffic density are electrified first. Where the freight traffic density is not comparatively large, diesel traction is introduced as a transitional stage.

Q. Periodic reports from the USSR mention plans for construction of atomic-powered locomotives. Is such a locomotive currently in the planning stage?

A. Work is in progress for the use of new kinds of traction. As for atomic energy, since it is being used at electric stations, apparently at present it is reasonable to assume that it may be applied in the form of electric energy for the electrification of the railroad network.

Q. To what extent is radio used on USSR trains?

A. Radio communication between locomotive crews and train dispatchers is being installed on the railways. The locomotives on a number of high density lines have been equipped in this manner. All switching locomotives at the stations have radio communication with the station dispatcher.

Q. Most European nations prefer the smaller four-wheel freight car, while the larger eight-wheel car is standard in the United States. What is the Soviet view as to optimum freight-car size?

A. Soviet railroads consider most effective the utilization of large four- and six-axle freight cars. Two-axle cars have not been constructed for many years.

Q. Is aluminum used, in whole or in part, in the fabrication of freight-car bodies?

CONTINUED

Chef Suprème Discute le Progrès Ferroviaire Soviétique

Quelle est la situation du train automatique tant discuté de l'URSS? Comment l'URSS se propose-t-elle d'appliquer la force atomique aux chemins de fer? Quels sont les rôles relatifs de diésilation et d'électrification dans les plans d'expansion ferroviaire soviétique? Comment l'URSS obtiendra-t-elle l'utilisation extrêmement intensive de wagons à marchandises? Dans un interview exclusif à l'International Railway Journal, le Ministre russe des Chemins de Fer Boris Pavlovich Beshchev a répondu e.a. à ces questions se rapportant à l'exploitation des chemins de fer russes. Le texte ci-joint est un compte-rendu de l'interview.

Hohe Beamte diskutieren Sowjet-Eisenbahn-Fortschritt

Welchen Status quo haben die viel besprochenen automatischen Züge der Sowjet Union? Welchen Vorschlag macht die USSR für Atomkraftanwendung im Eisenbahnverkehr? Welche Rolle spielen Verdieselung und Elektrifizierung bei den Erweiterungsplänen der Sowjet-Eisenbahn? Wie erreicht die USSR ihre äusserst grosse Nutzbarmachung der Güterwagen? In einem, dem International Railway Journal gewährten, exklusiven Interview beantwortet USSR Eisenbahn-Minister Boris Pavlovich Beshchev diese und andere Fragen über Russlands Eisenbahnverkehr. Der Begleittext ist eine Wiedergabe des Interviews.

Alto funcionario discute el progreso ferroviario en la URSS

¿Qué es del tren automático tanto comentado de la URSS? ¿Cómo la URSS se propone aplicar la fuerza atómica a operaciones ferroviarias? ¿Qué es des la dieselización y electrificación en los planes de desarrollo de los ferrocarriles soviéticos? ¿Cómo la URSS realiza la utilización intensa de carros de carga? En un interviú con la International Railway Journal, el Ministro de los ferrocarriles soviéticos Boris Pavlovich Beshchev ha respondido a estas cuestiones y a otras más en cuanto a las operaciones ferroviarias en la URSS. Este artículo contiene el texto del interviú.

Soviet Railway Minister, Following Visit to the United States,

A. Aluminum castings and low-alloy steel are beginning to be used at this time in railroad car construction.

Q. Has the USSR developed mechanical methods of detecting overheated journal bearings?

A. We have no need for technological devices to deal with hotboxes. Thirty years ago we started to use lubricator pads and at the present time we are intensively converting to roller bearings.

Q. How are freight cars and motive power maintained? Does each region have its own shops and facilities, or is heavy repair work channeled to a few major shops in centralized locations?

A. Current and medium repair of railroad cars is carried out in car shops located on the railways. Capital repair is accomplished at special car repair plants located in various parts of the Soviet Union.

Automation

Q. It is understood that tests of an automatic train have been conducted near Moscow.

What are the principles of automation involved? When will automatic trains become operational?

A. Automatic train operation has undergone first trials. A computer is utilized which—depending on the profile conditions, the duration of standing, the signal indications, and a number of other factors—selects the optimal operation of trains. The use of trains with automatic train control in regular service on the railways will depend on the success of further experiments. Wide application for automatic train control has been found in operations on the Moscow subway.

Q. What other types of automation are used on the Soviet railways?

A. Along with the wide application of automation in the organization of train traffic (automatic block signaling, central dispatching, automatic stopping devices, automatic humping, and other techniques), wider application of complex mechanization and automation of the productive processes are taking place—particularly the mechanization of maintenance-of-way and freight handling work and the automation of forecasting of the operational work of engineering, planning design, computation, and other work in rail transportation.

Q. Are electronic computers in wide use on USSR railways—in the handling of payrolls, for example?

A. Electronic computers are beginning to be introduced into rail transportation, including those for the production of traction computations, for the formulation of plans for the consists and scheduling of trains, the complete automation of classification work, automatic train operation, and so on. Computers are also used for the preparation of accounting and statistical reports and financial materials.

Permanent Way

Q. Are maintenance-of-way practices mechanized to any large extent in the USSR—or do you find it more efficient and economical to use men for track work?

A. Much attention is given to the mechanization of track maintenance work in the Soviet Union. This includes complex mechanization. To these ends the following devices are being introduced: Powerful machines for laying previously assembled track sections of 25-meter length; high-productivity Dragovtsev ballast cleaners, electric ballasting machines, spreaders, and many others. We hope in the next few years to complete the mechanization of maintenance-of-way work by machines suitable for application under the conditions of work on our railroads, which have a considerably

A SOVIET VIEW OF UNITED STATES RAILWAYS

Soviet Minister of Railways Beshchev and his group were given considerable opportunity to view US railway facilities and practices. At the close of their visit Soviet railwaymen had some frank comments about what they saw. Mr. Beshchev was asked to give his and the group's impressions.

Q. Mr. Beshchev, what single thing impressed you most about US railways?

A. Positive features are the wide application of diesel motive power, the exclusive use of four-axle freight cars, large railroad buildings at some stations, the use of electronic machines for various operations such as accounting. At the same time, the conviction grew among members of the delegation that technical equipment on American railways is being insufficiently utilized. Rail lines in this country are inadequately loaded and rolling stock is being utilized ineffectively. It is apparent in connection with this that the further improvement of a quantity of technical equipment is being delayed. While there is wide use of diesel traction, electric, which is more advanced, is being introduced at a slow rate.

Arriving at such a conclusion, we have no doubt that the Americans attach some priority to this problem. During numerous conversations with your specialists, we repeatedly had to listen to statements of a similar nature.

Q. Did you see any US railroad practices which are not now being followed in the USSR but which you think might be applied there?

A. To be in such a country as the United States for a month and to become acquainted with one of the largest railway systems in the world and not to observe anything new and interesting could be done only by a blind person or by one who understands absolutely nothing in this field. For example, a good impression was made by the partially automated sorting work at the Pennsylvania's Conway Yard, the use of calculating devices for a number of operations on the New York Central, the new types of passenger cars for suburban routes.

At the same time, the use of various types of technical equipment with which we became acquainted is not necessarily applicable in our circumstances. Among these should be included the accounting by number of rolling stock, the use of narrowly specialized platforms for piggyback (some of which are unnecessarily bulky).

Tells what the Russian Railroads are Doing and Plan to Do

greater traffic load of trains than the railroads of the United States, for example.

Q. To what extent is welded rail called for in current rail-laying programs?

A. We are widely applying the welding of rails on mainlines and especially in yards. We are utilizing various lengths of welded rail—from 200 to 1,200 meters—depending on the sections of our country. Further expansion is anticipated in the laying of welded rail.

Q. In many parts of the world, concrete sleepers are replacing the wooden variety. Is this true also in the Soviet Union?

A. Reinforced concrete sleepers are used in large quantity on the Soviet railroads. The volume is increasing all the time.

Labor and Wages

Q. How are railway employees paid, and how does the rate of pay compare with that for other kinds of employment?

A. Wages on the railroads depend upon specialties and professions and are either by the hour, piecework, or progressive piecework. Wages are paid in cash twice a month. The wages of railroad workers, if considered and compared according to qualifications, are about the same as wages in industry.

Q. What is the role of the railway labor union in the USSR?

A. The majority of railroad workers are union members. Unions play a large role in our country, carrying on large-scale organizational and educational work among the working people in our country and they strictly follow through on the fulfillment of established labor regulations. All transfers and dismissals, without exception, must be approved beforehand by the local union. Through a system of production meetings, organized by the unions, the workers actively participate in organization of the work of their enterprises.

Q. What methods are used to educate employees in safety, both as to train operation and as to safe working habits while on duty?

A. There is a special arrangement for techniques of safety approved by the MPS and the Central Committee of Trade Unions. A special administration in the Ministry of Railway Transport and the Office of Safety Techniques in the unions supervise the working out and control of these regulations with a suitable staff of special inspectors.

Q. Do you operate training schools for employees, technicians, and supervisors? Is there a sufficient flow of young people from the universities to meet replacement needs, or do young engineers in the USSR prefer to enter other lines of endeavor?

A. In the Soviet Union there are 12 institutes of higher education under the direction of railway transport, with 73,200 students; and 70 trade schools (technicums), with about 68,000 enrollees. In addition, the individual railways have a large number of technical and general schools. Graduates of transport schools, as a rule, remain to work on the railways, with the exception of a small group of specialists who transfer, according to plan, to other sectors of the national economy, also for utilization principally in transport work—for example, in large industrial enterprises. Also, specialists from non-transport institutes of higher education—for example, lawyers, chemists, metallurgists, etc.—transfer to railway transport. The influx of young people into advanced institutes is sufficient. Our transport institutes under their current development are guaranteeing to railroad transport the necessary numbers of highly qualified specialists.

Q. Did the US railways you visited appear to be technologically well advanced? Or did you observe procedures which impressed you as being inefficient or old-fashioned?

A. The technical equipment is basically appropriate to the existing level of traffic. (But) together with the use of new technical equipment, obsolescent equipment is also being applied.

Q. How do US railroads' technological research facilities—in Chicago, for example—compare with those of the Soviet Union? Are the two countries pursuing any similar lines of railroad research?

A. We are able to judge the conditions for scientific research work in the US on the basis of a visit to the Chicago (AAR) Research Center, which was of great interest to us. The opinion of members of the delegation was that scientific research investigations at that center can be considerably broadened.

Q. Did you see everything you asked to see in the US? Were all your questions answered? Were any restrictions placed on you during your visit?

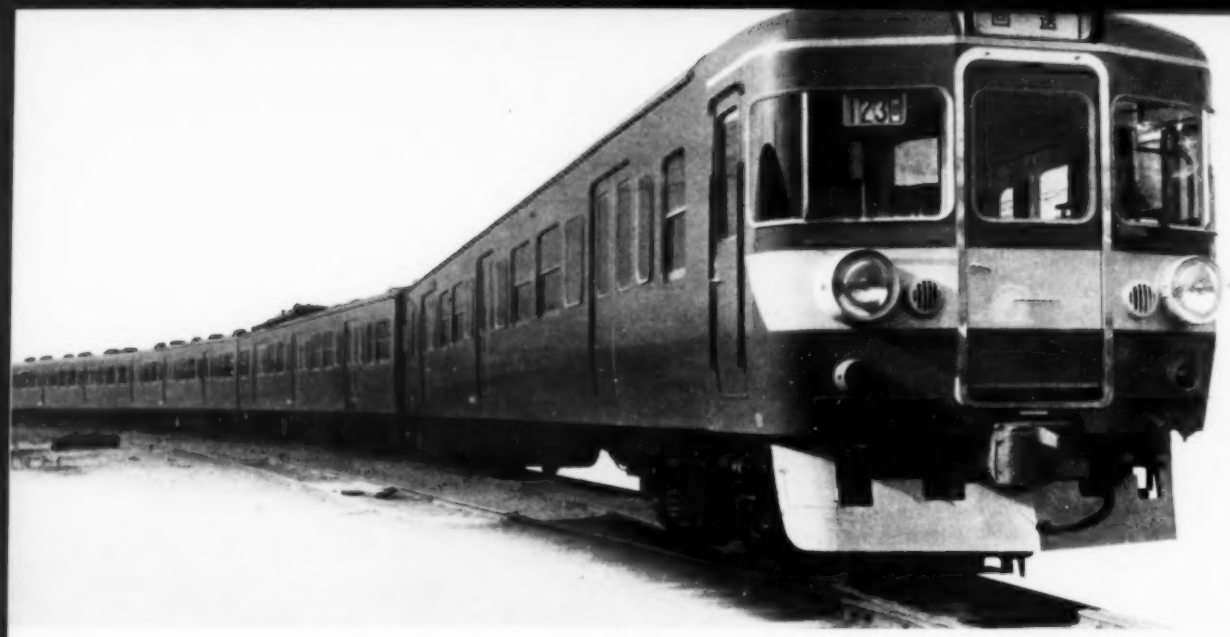
A. In our opinion, the best answer to the question as to whether we saw everything we asked to see is our sincere gratitude to the AAR and above all to its vice president, Mr. Buford, for the organization of our big and interesting trip through the United States . . .

However, since we have been asked concerning objections regarding the organizers of our trip, the members of the delegation expressed their regret concerning the changes in the itinerary, which, in our opinion, were without foundation and which were not coordinated with us, as a result of which we were deprived of the opportunity of visiting New Orleans and instead spent almost 40 hours in the railway car.

It is, of course, also a pity that our locomotive engineers were not shown the promised gas-turbine engine and the production of new locomotives, and that the specialists on signals and communication were refused the short trip to Indianapolis.

However, these objections are not the main thing.

Surely, the most important point about our trip is that this exchange of delegations of specialists of railway transport promoted the strengthening of business-like friendship between the Soviet and American peoples.



Tokyo Railway Conference Was S

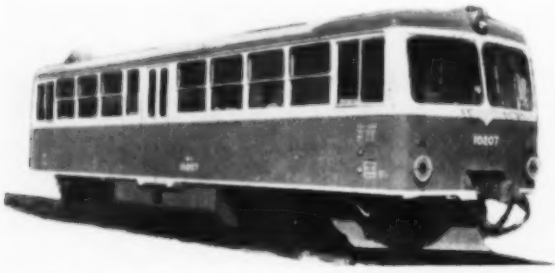
In addition to serving as an "idea forum" for top-level railway officials from throughout the Asian continent, the second Asian Railway Conference in Tokyo (IRJ January 1961, p. 46) provided an unusual opportunity for Japan's flourishing railway supply industry to display a wide variety of motive power and rolling stock. Altogether 48 individual items of equipment were shown on the grounds of the Japanese National Railways' Technical Research Institute near Tokyo. While electric equipment, especially for industrial-frequency AC, naturally drew a great deal of attention, the equipment show included diesel locomotives and railcars, passenger equipment, and a wide selection of standard and special-purpose freight rolling stock.

Maintenance machinery and other items of interest to railway officers were also displayed.

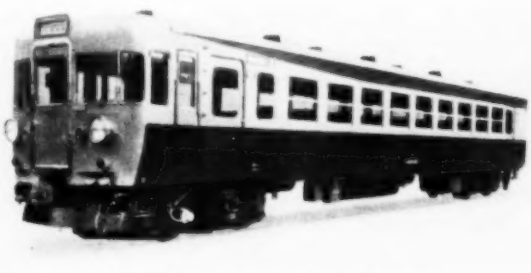
Passenger Cars

Passenger equipment, especially in the form of trainsets and self-propelled railcars (both diesel and electric), drew considerable attention. Delegates received a preview en route to the display area, riding the new diesel-powered deluxe train "Hatsukari." Designed to furnish the same type of service as the well-known electric "Kodama" and "Tsubame" trains, the "Hatsukari" offers the same luxury for travelers on non-electrified lines of the JNR. Equipment for the "Hatsukari" series is built by Kinki Sharyo, Teikoku, Kawasaki, Hitachi, Niigata, Nippon Sharyo, Tokyu, Kisha Seizo Kaisha and Fuji Heavy Industries. Other diesel-powered passenger equipment displayed included the KIHA 55 320-hp diesel-hydraulic railcars built by Niigata, Teikoku and Fuji for JNR semi-express service; the experimental KIHA 60 hydraulic-drive 400-hp railcar by Niigata, Teikoku and Tokyu; and Tokyu's two-axle diesel-mechanical railbus, used on lightly-traveled lines on the island of Hokkaido.

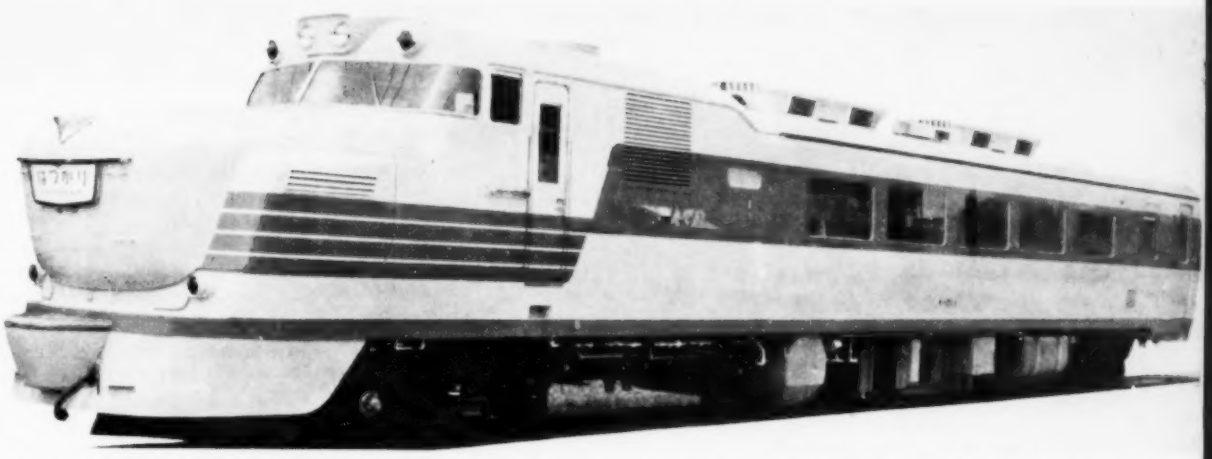
Electric railcars were also well represented: AC cars included the Kumoya 791-1 type with AC commutator motors and the experimental Kumoya 790-11 car for branch-line service employing an



Diesel railbus, 75 hp, by Tokyo for JNR branch-line passenger service.
Autorail diesel de 75 CV par Tokyu pour ligne secondaire JNR.
Dieseltriebwagen, 75 PS, von Tokyu für Nebenbahnen.
Ferrobús diesel, 75 CV, de Tokyu para servicio de pasajeros.



"Tokai" electric railcar built by several builders for JNR.
Autorail électrique "Tokai" JNR par différents constructeurs.
"Tokai" elektrischer Triebwagen für JNR; verschiedene Hersteller.
Automotor eléctrico "Tokai" para JNR, construido por varias casas



Dual-service "Joban" AC-DC trains by Hitachi and Kawasaki have silicon rectifiers; diesel-powered Hatsukari carried delegates to display.
Les trains "Joban" bi-courant par Hitachi et Kawasaki, à redresseurs silicon; l'Hatsukari-diesel a amené les délégués à l'exposition.
Gleich Wechselstromzüge "Joban" von Hitachi und Kawasaki haben Silikongleichrichter; Delegierte mit Diesel-Hatsukari zur Ausstellung.
Trenes de dos corrientes (CA-CC) "Joban" de Hitachi y Kawasaki tienen rectificadores silicón; Hatsukari diesel condujo a los participantes.

Showcase for New Equipment

induction motor and planetary gearbox (IRJ, October 1960, p. 34), as well as the AC–DC dual-service cars of the "Joban" type, being used for comparison testing of silicon and mercury-arc rectifiers. Other JNR railcars included the "Tokai" MU series by Nippon Sharyo, Kawasaki and Kinki Sharyo; Kumoya 100–911 and 101–911 cars with regenerative braking by Nippon Sharyo and Toshiba, and the Kumoya 93,000 overhead line testing car built in the Toyokawa shops of the JNR.

Equipment for Japan's private railway lines was also shown: an air-conditioned "Vista-dome" car for the Kinki Nippon line by Kinki Sharyo, a subway car by

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Exposition de matériel roulant à Tokio

Le Seconde Conférence Ferroviaire Asiatique à Tokio (IRJ, janvier 1961, p. 46) a fourni une occasion à l'industrie fournisseur japonais de montrer un grand choix en matériel moteur et roulant.

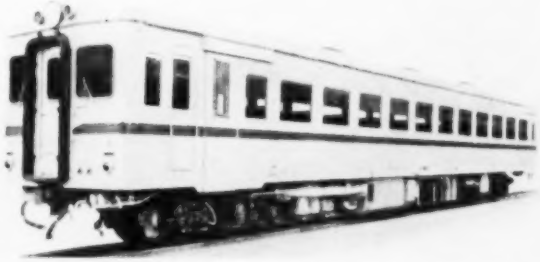
Rollmaterial-Ausstellung in Tokio

Die zweite Asiatische Eisenbahn-Konferenz in Tokio (IRJ, Januar 1961, S. 46) gab Japans Eisenbahnbelieferungsindustrie Gelegenheit, umfangreiches Locomotiven-und Rollmaterial auszustellen.

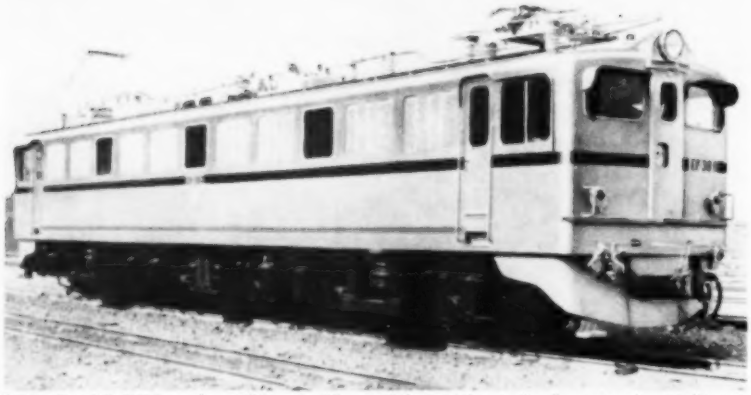
Exhibición de material rodante en Tokyo

El segundo Congreso Ferroviario Asiático en Tokyo (IRJ, enero 1961, p. 46) ofrecía a la industria de equipos ferroviarios de Japón ocasión para exhibir una gran serie de fuerza motriz y material rondate.

Express streamliner cars by Nippon Sharyo and Hitachi.
Voitures aérodynamiques expresse par Nippon Sharyo et Hitachi.
Express-Stromlinienwagen von Nippon Sharyo und Hitachi.
Coches aerodinámicos de Nippon Sharyo e Hitachi.



Experimental diesel-hydraulic railcar by Niigata, Teikoku and Tokyu.
Autorail diesel-hydraulique par Niigata, Teikoku et Tokyu.
Diesel-hydraulischer Schienenwagen von Niigata, Teikoku und Tokyu.
Automotor diesel-hidráulico de Niigata, Teikoku y Tokyu.



Bo-Bo-Bo AC-DC loco has silicon rectifier, stainless-steel exterior for corrosion resistance.
Locomotive Bo-Bo-Bo bi-courant à redresseur silicon, extérieur en acier inoxydable.
Bo-Bo-Bo Gleich /Wechselstromlok hat Silikongleichrichter und rostfreie Bekleidung.
Locomotora Bo-Bo-Bo CA-CC tiene rectificador silicón, exterior de acero inoxidable.

Hitachi-built Bo-Bo ED 71 unit for AC lines has mercury-arc rectifier.
Bo-Bo ED 71 pour lignes AC, à redresseurs à vapeur de mercure.
Bo-Bo ED 71 Einheit für Gleichstrom mit Quecksilberbogengleichrichter.
Bo-Bo ED 71 de Hitachi tiene rectificador de vapor de mercurio.

Bo-Bo-Bo by Kisha Kaisha, Kawasaki, and Tokyo Denki for DC lines develops 1650 hp.
Bo-Bo-Bo Kisha Kaisha, Kawasaki et Tokyo Denki courant continu développe 1650 CV.
Bo-Bo-Bo von Kisha Kaisha, Kawasaki, und Tokyo Denki für Wechselstrom entwickelt 1650 PS.
Bo-Bo-Bo de Kisha Kaisha, Kawasaki y Tokyo Denki para líneas CC tiene 1650 CV.

Motive Power Shown

Teikoku for the Teito Rapid Transit Authority, and a Gakunan Railway stainless steel car by KSK.

Locomotive-hauled passenger equipment for long-distance overnight trains, built by Nippon Sharyo and Hitachi, was displayed, along with the KANI 38 baggage car with whole-side shutter doors, built by JNR's Oi workshops.

Motive Power

As was the case with railcars, interest was high in the electric locomotives displayed.

Two Bo-Bo-Bo heavy-duty locomotives were shown: the Mitsubishi-built EF 30 for AC–DC operation, featuring silicon rectifier and a stainless-steel body shell, and the DC EF 60 type, built by KSK, Kawasaki and Tokyo Denki for service on 1500-volt lines. Straight AC locomotives shown were the ED 45 and ED 71 types by Hitachi, Toshiba and Mitsubishi, both Bo-Bo units, and the dual-service Bo-Bo ED 46 by Hitachi was also displayed.

Diesel locomotives included the DF 50 mainline diesel of the JNR, a 1400-hp Bo-Bo-Bo built by Hitachi, Kawasaki, Mitsubishi, Nippon Sharyo and KSK, and the DD 13 shunter, a B–B diesel-hydraulic by Kawasaki, KSK, Nippon Sharyo, Hitachi and Mitsubishi. Particular attention was focussed on the DD 1000 HV yard-road diesel hydraulic. The 1100-hp B–B unit was built by Nippon Sharyo (mechanical portion), Mitsubishi (Mitsubishi-MAN L 12V18/21AL 1500-rpm engine) and Fuji Electric (model LT 306r Fuji-Voith torque converter).

Hitachi exhibited two locomotives, an 1100-hp diesel hydraulic and a 950-hp diesel-electric for the State Railway of Thailand (see p. 16).

A great deal of interest was shown in Toshiba's 25-ton shunter. Displayed for the first time, the two-axle unit is Toshiba's first venture into complete locomotive construction, and features a transmission consisting of Louis de Roll (Switzerland) oil motors supplied by a swash-plate plunger-type oil pump driven by a DMH 17C 180-hp diesel engine. With only three controls in the cab (brake, three-position throttle—start, idle and full speed—and a pump pressure control handwheel), the shunter has a maximum tractive effort of 7500 kg.

Included AC and DC Electrics, Diesels from 180 to 1400 HP

Though railcars and locomotives drew a great deal of attention, freight equipment was well represented. Two JNR experiments in self-propelled freight cars were shown. Designed primarily as a prototype of equipment to be used on the now-building standard gauge Tokaido line, the Kumoya 22 electric railcar was built by the Toyokawa shops of JNR for container service (photo IRJ January 1961, p. 51). Also on display was an internal-combustion-powered box car for branch-line package service, the KIWA 90 type built by JNR's Hamamatsu shops.

Other Hamamatsu shops' products exhibited were the SIKI 500 depressed center flat car with a capacity of 100 tons and the SO 160 crane.

Several standard closed cars were shown: the WAMU 70,000 type box car of the JNR, built by 11 different manufactures; the RE 12,000 refrigerator car, supplied by ten manufacturers and two JNR workshops, and the REMU 400 dual-purpose box and refrigerator car built by Nippon Sharyo.

In terms of sheer size and capacity, the most impressive car shown was the SHIKI 600 Schnabel-type heavy-load car. Designed specifically for the handling of heavy electrical transformers, the car was built for Fuji Electric by Nippon Sharyo. With an empty length of 32.9 meters (44.26 m with the transformer supported between the two halves of the Schnabel bridge) and 94.8-ton tare weight, the car has a capacity of 240 tons.

The car rides on eight six-wheel bogies of the equalized rigid-bolster type having a 2.6-m rigid wheelbase and 800-mm wheels with spoked cast steel centers. Axle load with a 240-ton transformer load is 13.94 tons, 3.95 tons when empty. Rubber-cushioned hydraulic draft gear made by the Kayaba Industry Company is used: for proper braking both loaded and empty, the car is fitted with 180/254 × 250-mm UC brake cylinder and K-2 triple valve: with air supplied to both sides of the piston the cylinder acts as a 180 cylinder; with air supplied to one side only operation is as a 254 cylinder.

While heavy-load cars have previously been restricted to special train movements the SHIKI 600 has been designed to permit operation in regular freight trains. Another feature of the car's construction is the use of a plate girder construction for the Schnabel section itself; while a truss design is normally used, the plate construction was used for more convenient application of the moveable side bearers. On the press pad a screw jack is fitted for adjustment of the load.

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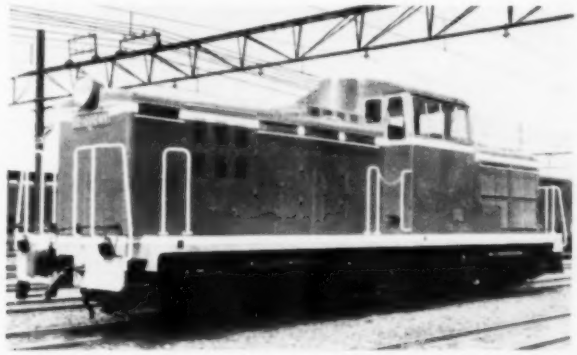
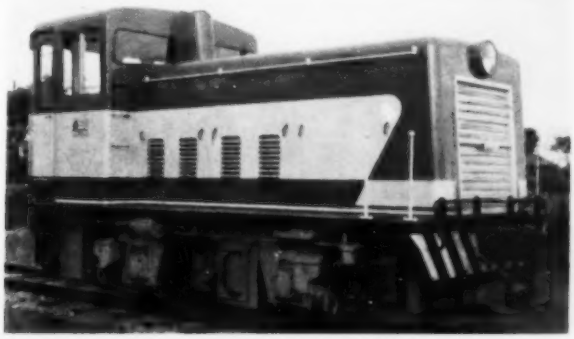
Standard mainline diesel-electric on JNR is 1400-hp Bo-Bo-Bo unit.
Diesel-électrique standard pour lignes JNR, 1400 CV Bo-Bo-Bo.
Dieselelektrische Bo-Bo-Bo 1400 PS, für JNR Hauptstrecke.
Bo-Bo-Bo de 1400 CV es el diesel-eléctrico más empleado en los JNR.

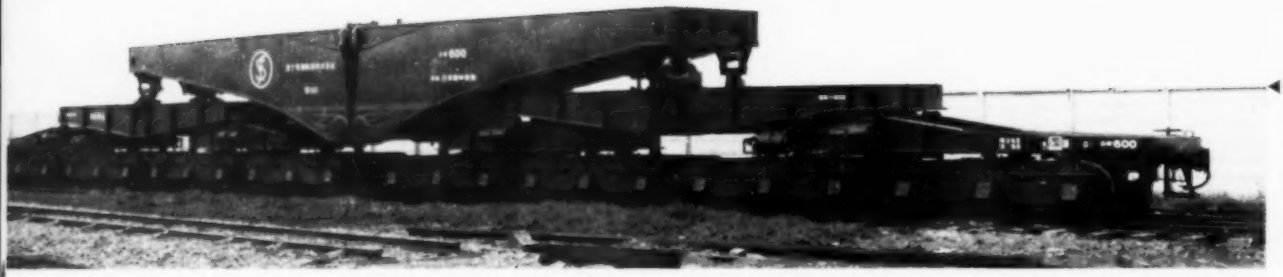


Nippon Sharyo 1100-hp diesel-hydraulic for yard and road service.
Diesel-hydraulique Nippon Sharyo 1100 CV, à service double.
Nippon Sharyo 1100 PS diesel-hydraulische Lok für Duobetrieb.
Diesel-eléctrico Nippon Sharyo de 1100 CV para el patio y la linea.

DD 13 diesel hydraulic shunter is built for JNR by several suppliers.
Diesel-hydraulique de manœuvre DD 13, construit pour JNR.
DD 13 diesel-hydraulische Rangierlok für JNR; verschiedene Hersteller.
Máquina de maniobras diesel-hidráulica construida por varias casas.



Toshiba's first locomotive is 25-ton shunter with hydrostatic transmission.
Locomotive de manœuvre de 25 tonnes à transmission hydrostatique.
Ein 25 Tonnen Rangierer, mit hydrostatischem Antrieb.
Máquina de maniobras con transmisión hidrostática.



Giant Heavy-Load Car, Big Tank Cars, Container Equipment

Also displayed were cars featuring special construction for quick loading and unloading. The WAMU 80,000 box car, with full-opening side doors, is designed for palletized cargo, and is built for JNR by Nippon Sharyo, Kawasaki, Hitachi and KSK; two cars with full-opening retractable roof were shown, both built by KSK, and Tokyo Denki exhibited a 30-ton airslide car for bulk dry cargo.

Three tank cars of unusually large design were shown. Most unusual of the group is an all-aluminum-alloy car designed for carrying 40-ton loads of bulk alumina powder. With a capacity of 57.1 m³, the car measures 13.75 m in length and has a tare weight of only 14 tons; air activation of the cargo permits unloading in five to six minutes. Three cars have already been built by Kawasaki and three are on order for a private company.

Another tank car of considerable interest to visitors was a 50-ton car for gasoline transport, riding on six-wheel bogies. The car has an overall length of 18.58 m, tank length of 16.55 m and

Large tank cars drew attention; 50-ton car (top) by Nippon Sharyo; aluminum-alloy tank for bulk dry cargo (center) by Kawasaki; Mitsubishi propane tank (bottom) with 47.2 m³ capacity.

Grands wagons-citerne ont attiré l'attention; wagon 50 tonnes (ci-haut) par Nippon Sharyo; citerne alliage aluminium pour cargaison sèche en vrac (centre) par Kawasaki; citerne propane Mitsubishi de 47.2 m³.

Schwere Kesselwagen, die auffielen: 50 Tonnen Wagen von Nippon Sharyo (oben); Wagen Aluminiumlegierung für Sperrgut-Trockenfracht (Mitte) von Kawasaki; Mitsubishi Propan-Tankwagen (unten), Leistung 47.2 m³.

Grandes vagones cisternas: vagón de 50 toneladas (véase arriba) de Nippon-Sharyo; cisterna de aluminio para cargas secas a granel de Kawasaki; cisterna para propano de Mitsubishi (véase abajo).

Containers and road-rail equipment were featured: KSK displayed Flexi-Van units and flat car with 5-ton containers.

Containers et matériel rail-route: KSK exposait Flexi-Van et wagon plat avec containers de 5 tonnes.

Behälter und Schienen-Strassen-Ausrüstung: Flexi-Van Einheiten und Flachwagen mit 5 Tonnen Behälter von KSK.

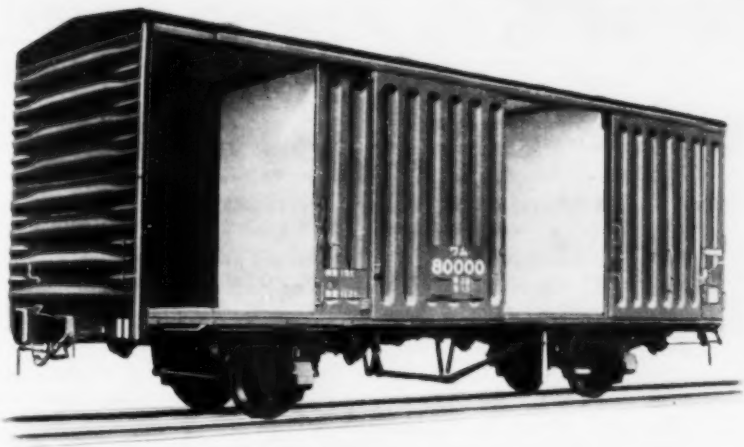
Exhibicion de containeres y equipos ferrocarril-carretera; Flexi-Van KSK y vagones con containeres de 5 toneladas.

Schnabel-type transformer car has 24 axles, 240-ton capacity. Built by Nippon Sharyo for the Fuji Electric Co., car is one of heaviest ever built for narrow gauge.

Wagon transformateur, type Schnabel à 24 essieux, capacité 240 tonnes. Construite par Nippon Sharyo pour Fuji Electric Co., une des wagons les plus lourdes jamais construites pour voie étroite.

Schnabel-Typ Transformatorwagen hat 24 Achsen, Leistung 240 Tonnen, von Nippon Sharyo für Fuji. Einer der schwersten Wagen, die je für eine Schmalspur gebaut wurden.

Vagón para transformadores tiene 24 ejes, capacidad 240 toneladas. Construido por Nippon Sharyo para Cía Eléctrica Fuji, uno de los más pesados para vía estrecha.



Impressed Rail Men

tank diameter of 2.5 m. The car measures 2.74 m in width, 3.85 m in height, and has a 30.5-ton tare weight. The car was built for the Shell Company by Nippon Sharyo.

The third tank car displayed was a 20-ton propane carrier with a 47.2-m³ tank capacity and 17.9-m length, built by Mitsubishi Heavy Industries for the Central Oil Company. The car has a tare weight of 32 tons and is insulated with a 75-mm thickness of expanded polystyrene foam.

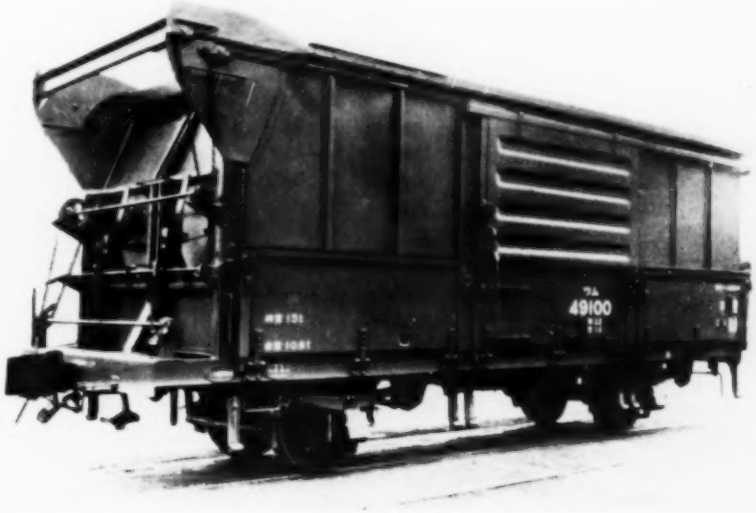
With the use of containers growing in Japan as elsewhere, considerable interest was shown not only in the motorized container car and the model of the future Tokaido-line electric trainsets for container service, but also in a flat car carrying five containers of five-ton capacity, and in KSK's prototype Flexi-Van equipment. While Flexi-Van equipment is now used in trans-Pacific shipments to Japan, clearance restrictions have kept the van units confined to road haulage in Japan itself. The units displayed at the Tokyo exhibit are prototypes for equipment which will be used on the Tokaido line when it goes into service in 1964.

Cars featuring easier loading were shown: closed car for palletized loading has full-opening sides; sliding-roof open car is by KSK.

Wagons de chargement plus facile: wagon fermé à côtés ouvrant entièrement; wagon couvert à toit glissant par KSK.

Wagen für leichtere Ladung: geschlossener Wagen für palletisierte Ladung mit vollständig zu öffnenden Seiten; offener Wagen mit Schiebedach von KSK.

Vagones para carga más fácil: vagón para carga paletizada tiene lados abiertos; vagón de techo corredor de KSK.



New Gas Plant Supplies Fuel for

Nouvelle Usine à Gaz Fournit aux Ateliers

Tandis que des choses telles que la force motrice, la voie permanente, le schéma d'exploitation et la signalisation, sont facilement reconnaissables comme appartenant à la "technologie ferroviaire" traditionnelle, une exploitation à rendement exige de nombreuses installations rarement considérées comme outillage ferroviaire. Il s'agit en l'occurrence d'une nouvelle usine à gaz qui vient d'être mise en service pour fournir le combustible requis pour les différentes opérations de chauffage aux ateliers Koedoespoort des Chemins de Fer de l'Afrique du Sud. D'un débit de 120 millions de BTU/heure, la nouvelle usine produit assez de combustible pour desservir une ville de 300.000 habitants. Ses gazogènes à six grilles rotatives, brulant du charbon poisseux d'une mine voisinante, fournissent un gaz chaud et brut à deux chaines de refroidisseurs et de purificateurs, produisant un combustible final d'une pyrnité de 26 grains par 100 m³. Chacun des six gazogènes consomme 1100 kgs de charbon par heure et le système de refroidissement utilise 660.000 litres d'eau par heure.

Neue Gasfabrik versorgt Eisenbahnwerkstätten

Während Worte wie Triebkraft, Eisenbahnstrecken, Betriebsplanung und Signalsystem zum Kern der traditionellen Eisenbahnterminologie gehören, fordern zweckmässige Eisenbahnbetriebe viele Anlagen, die selten als Eisenbahnzubehör betrachtet werden. Hierzu gehört eine neue Gasfabrik, Wert £350.000, die gerade in Betrieb genommen wurde, um die vielen Feuerungsanlagen in den Koedoespoort Werkstätten der südafrikanischen Eisenbahn mit Betriebsstoff zu versehen. Mit einer Leistung von 120 Millionen BTU pro Stunde, produziert die neue Fabrik genug Betriebsstoff für die Versorgung einer Stadt mit 300.000 Einwohnern. Ihre sechs Drehrost-Gaserzeuger, mit bituminöser Kohle aus nahen Gruben gefüllt, führen heisses Rohgas in zwei Serien Kühl- und Reinigungsbehälter, die das Endprodukt mit einer Reinheit von 26 Grän pro 100 m³ liefern. Jeder dieser sechs Gaserzeuger verbraucht 1100 kg Kohlen pro Stunde und das Kühlsystem 660.000 Liters Wasser pro Stunde.

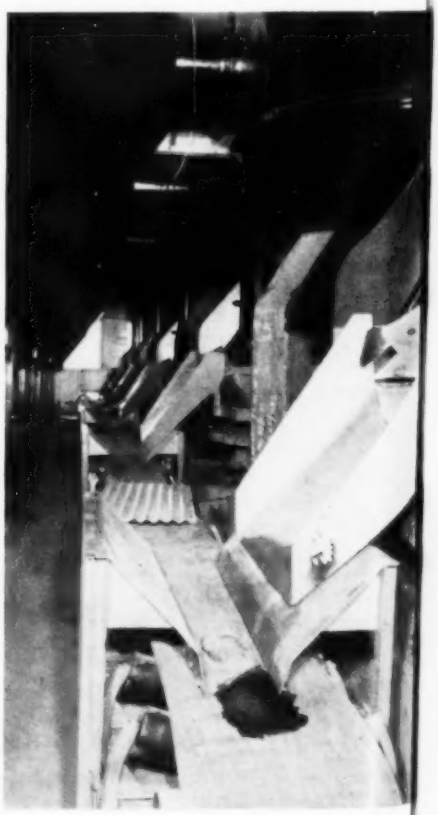
Nueva planta de gas para talleres ferroviarios

Fuerza motriz, superestructura, planificación de operaciones, señales y más cosas así se pueden reconocer facilmente como partes de la tradicional "tecnología ferroviaria". No obstante, el éxito de las operaciones depende también de muchas instalaciones no fáciles de reconocer como equipo ferroviario, tal como una nueva planta de gas (costo £350.000) puesta en marcha para proporcionar combustible para mucha aplicaciones en los talleres de Koedoespoort de los Ferrocarriles sudafricanos. Tiene una capacidad de 120 millones de BTU por hora y produce bastante combustible para una ciudad de 300.000 habitantes. Sus seis generadores con parrillas rotatorias alimentados de carbón bituminoso proporcionan gas cálido y crudo que después de ser enfriado y limpiado produce combustible de una pureza de 26 granos por 100 m³. Cada uno de los seis generadores de gas consume 1100 kg. de carbón por hora, la instalación enfriadera consume no menos de 600.000 litros de agua por hora.

The new gas-producer plant for supplying gas to the 79 gas furnaces in the workshops and foundries at Koedoespoort, biggest mechanical workshops of the South African Railways, will go into service next month. This £350,000 plant on which work was started a year ago is being built on contract.

In view of the large number of furnaces used for heating metals, annealing castings, drying cores and moulds and for various heat treatment purposes, a plant capable of producing 1,200 therms or in other words 120 million British thermal units per hour, was necessary. This is equivalent to the household heating requirements of 300,000 people or 75,000 houses based on families of four.

The most economical method was determined by analyzing the relative costs of electricity, oil or gas, and the investigations revealed that for the quantity of heat required gas produced from bituminous coal would be the cheapest and would cost about 2.5 d per therm. This fuel had the added advantage of being



Shops of South African Railways

available in close proximity to Pretoria.

The plant at Koedoespoort consists of six rotary grate gas producers each with a capacity of 200 therms, an internal diameter of 3.04 m, consuming 1100 kg of coal per hour and giving a gas of heating value of at least 5300 British thermal units per cubic meter. Each of the producers weighs approximately 63 metric tons.

To provide storage for the large quantity of coal required by the plant an underground coal bunker of 1270 tons capacity, representing approximately 14 days supply, has been constructed. This bunker is charged from railway trucks positioned on a track passing across the top of the bunker. The coal is automatically fed from the bottom of this bunker, by means of a rotary plough, conveyor belts and skip hoist to the six 23-ton capacity bins, one of which is mounted above each producer. The coal delivered is screened to 2.2–3.8 cm at the colliery.

From these overhead bins, the coal is fed into the gas producers at a pre-determined rate by automatic, gas-tight stokers, and is levelled off inside the producers by water-cooled revolving rakes which can be varied in height according to the requirements in the producer.

The air and steam mixture which is required to assist in the formation of the gas, enters the producers through the revolving grate, at a temperature of about 50 C. The air is supplied to the producers via an air main common to them all and fed by a blower fan of 237.7 m³ capacity. A second similar fan functions as a standby. The steam which is generated in the water jacket surrounding the main body in the fire zone of each producer passes into a steam collector drum above each producer.

To insure that the gas generated in the producer is thoroughly cleaned before it enters the mains for delivery to the burners of the furnaces, two-stage gas cleaning plants have been installed, each having a capacity of 1490 m³ of gas per hour. These two plants are so interconnected that the gas from any producer can be directed through either or both of the plants.

The raw hot gas generated in the producers passes from the latter at a temperature of over 600 C into large refractory-lined dust cyclones—one to each producer—where dust, ash and grit carried over in the gas is deposited before the gas passes into the bottom of the pre-coolers which consist of six tall steel cylindrical towers, each serving one producer. As the gas passes through these towers, tar, ammonia and other constituents are deposited from the gas onto a large number of porcelain ferrules contained in the towers. These deposits are washed off by a series of water sprays fitted at three different levels in the tower and the gas is at the same time cooled down to an exit temperature of between 80 and 90 C. From these coolers the tar and other by-products flow into ponds which are heated by steam coils to keep the tar in a fluid state and assist in its separation from the other materials for final disposal.

The gas flows from the pre-coolers into a manifold gas pipe which is fed from all of the producers and from there it passes into either of the two gas-cleaning plants which each comprise a first-stage disintegrator and drop catcher followed by an end-cooler with a second-stage disintegrator and drop catcher.

The gas then enters the first-stage disintegrator which, working much on the principle of a cream separator and assisted by the injection of wash tar from the ponds, separates out the tar from the gas. After leaving the disintegrator, the gas passes through a large drop-catcher drum filled with porcelain ferrules where it is freed from drops of wash tar which cling to the ferrules.

It then passes into a huge vertical steel cylindrical end-cooler tower 4.25 m in diameter and over 19.7 m high. There are two of these—one per cleaning plant—

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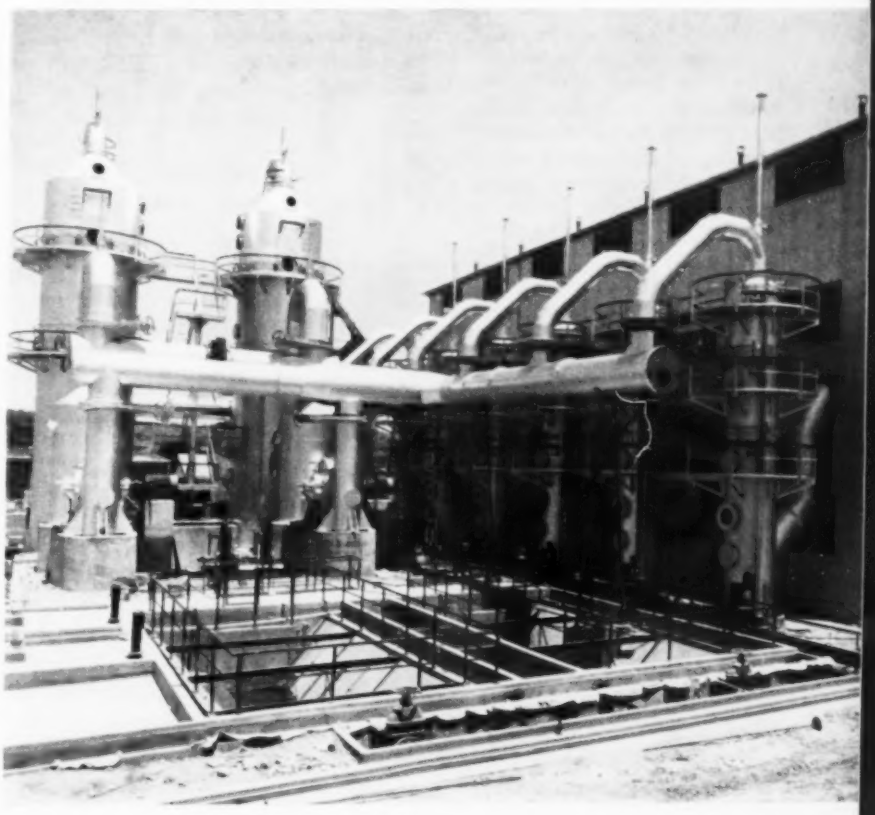


Conveyor belt in center removes ash from gas producer units; bottoms of cyclone dust catchers show at left.

Courroie transporteuse au centre enlève cendres des gazogènes; les fonds des attrape-poussière cyclone sont visibles à gauche.

Förderband, Mitte, entfernt Asche von den Gaserzeugern; Unterseiten der Zyklonstaubsauger sind an der linken Seite zu sehen.

Tapiz rodante transporta las cenizas de los generadores de gas; a la izquierda los fondos de los separadores de polvo.

and each also contains thousands of porcelain ferrules for trapping material—principally oil at this stage—in suspension in the gas. The oil and a small amount of tar is washed from the cooler by a series of sprays in similar manner to those in the pre-coolers and flows into the clarification ponds where the oil and tar separate by virtue of differing specific gravities and are led into two ponds where tar and oil are separately stored ready for final disposal.

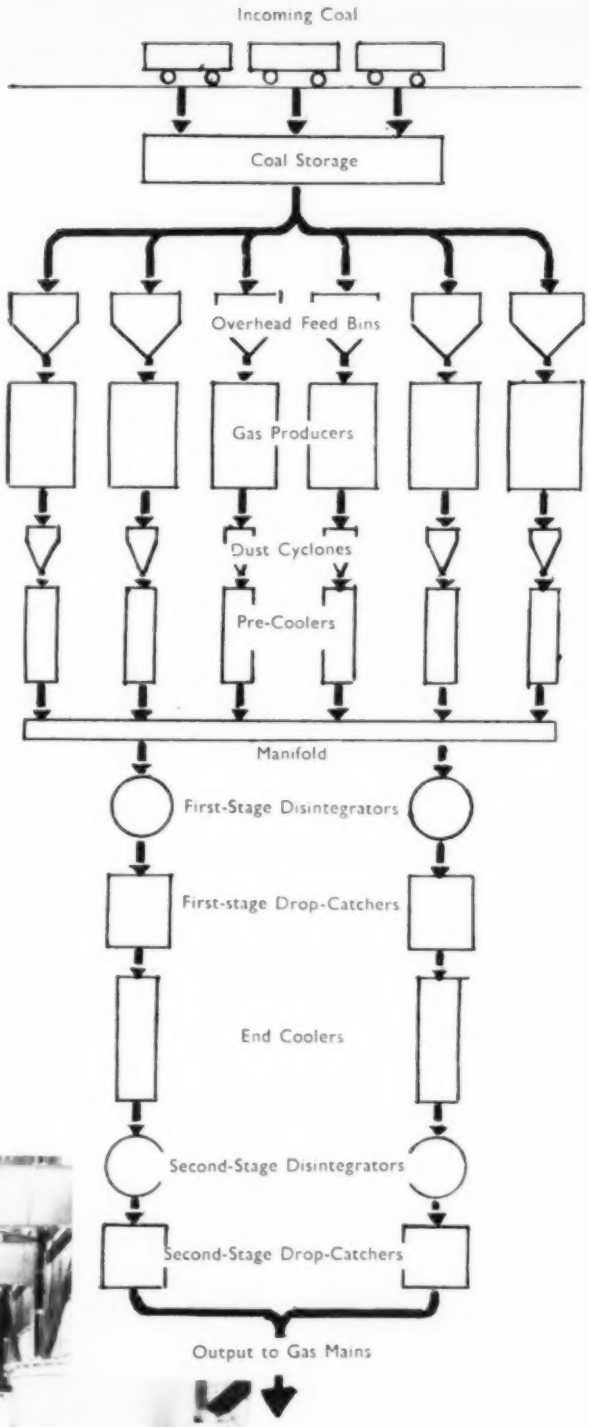
When the gas emerges from the end-coolers it has been cooled down to about 30 C and it then passes through the second-stage disintegrator and drop-catcher and thence to the gas mains leading to the workshops and foundries. By this time it has been thoroughly dried and cleaned to a purity of at least 26 grains per 100 m³.

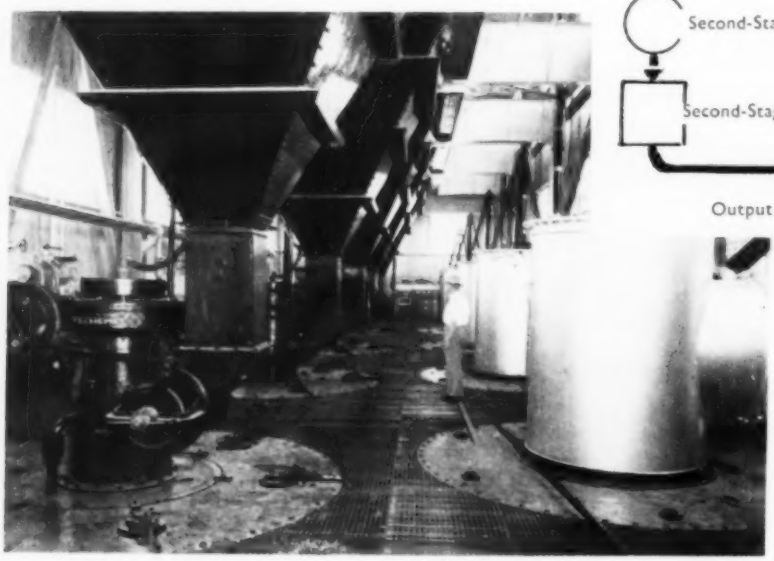
Booster fans are installed in the gas mains, close to the gas exit from the cleaning plant, to insure that there is ample pressure at the burners on the furnaces.

The water used in the pre- and end-coolers, 660,000 liters per hour, is conserved by recirculating it, after it has been clarified in the ponds and has been cooled from about 37 C to 25 C by passing it through a forced draught water cooling tower.

Automatic controls regulate the plant so that any variations in gas pressure, temperature, etc., are immediately taken care of and the plant will continue functioning in an efficient manner.

In addition a series of gas analyzers are provided so that immediate readings of the various constituents can be determined.





Coal feed hoppers and tops of dust cyclones are shown in this view, of gas plant's upper working level.

Trémies de déversement de charbon et les dessus des cyclones poussières visibles dans vue d'ensemble de l'usine.

Kohlen-Fülltrichter und Zyklonstaubsauger von der oberen Arbeitsfläche einer Gasfabrik aus gesehen.

Tolvas de alimento de carbón y partes superiores de los ciclones de polvo (nivel de operación superior).

New Proposals for British Rails

Major changes in the structure and finance of the British state transport system are foreshadowed in a government White Paper published in December ("Reorganisation of the Nationalized Transport Undertakings"). The main proposals are:

• To replace the British Transport Commission and the existing organization by a new structure designed to overcome the main defects and disadvantages of the present organization.

• To reconstruct the finances of the Commission and, in particular, those of the railway.

• To give the various undertakings the maximum freedom of operation in commercial affairs.

The White Paper does not mince matters; it says that sweeping changes are needed.

It hints that the public will have to accept the possibility of higher charges; that the labor force will have to increase productivity; and that the taxpayer will have to face a major capital reorganization—and carry the burden until the railways are a paying proposition. While admitting the vital role that the railways play in the economy of the country it states that the Government's aim is a nationalized transport undertaking which "shall be soundly based both in organization and finance."

As far as the structure is concerned the proposal is that each of the main activities of the present British Transport Commission shall be managed by a separate board, holding its own assets and responsible for its own capital debt. These boards will be as follows: British Railways, London Transport, British Transport Docks and a holding company. The latter will be responsible for British Road Services, hotels, bus companies, shipping services, and Thomas Cook & Son, Ltd.

The British Railways Board will assume the responsibility for running the railways but it will only perform those central functions which are essential to the running of the railways as a single entity.

The board will be responsible for such things as national staff and wage negotiations, overall control of finance and investment, policies for safety, training and research and the determination of the future size of the system. Responsible for the management and operation of the regional railway systems will be Regional Railway Boards, which will replace the present Area Boards. This, it is claimed, will assist in the delegation of authority and the decentralization of management. Regional business accounts will be maintained by the boards to secure the highest level of efficiency and economy.

Between the Minister of Transport and the various boards will be a Nationalized Transport Advisory Council. The council's main purpose will be to advise the Minister on questions relating to coordination of the various undertakings and on questions of policy. It will have no executive function and consist of the chairmen of the Boards plus members drawn from outside the nationalized transport undertakings.

A far-reaching financial reconstruction is necessary because of the present plight of the undertaking. By the end of 1960 the deficits of the BTC reached a total of £500 million, the rate of annual deficit being in the region of £100 million. What is planned is a drastic scaling down of the present debt to give the railways a fresh start.

The proposal is to wipe out £400 million in railway debt and place a further £800 million in suspense, relieving the railways of some £40 million in interest a year. The White Paper goes on to say that the railways must try to eliminate their operating loss, now running at about £60 million a year and to be able, within five years, to meet their interest charges out of revenue.

Greater commercial freedom is promised and the present restrictions on rail freight charges and passenger fares are, it says, no longer justified. Statutory control over fares and charges will therefore be removed, except for fares in the London Transport area.

Initial reactions to the Government's proposals have been fairly uniform on one point: that the realistic acceptance of the financial state of the railway system is necessary, however unpalatable such acceptance may be.

The proposed structure of the undertaking, on the other hand, has come in for a fair amount of criticism. It has been argued that the virtual dissolution of the BTC would be unfortunate and that the top policy control of the organization will be too much under the direct guidance of the Minister of Transport. This would mean possible political influence on an organization which is attempting to operate on a commercial basis, also that the greater autonomy to be granted to the Regions may not produce the far-reaching effects anticipated. The proposals were due to be debated in Parliament on the 30th January.

Sweeping Changes Proposed For British Transport

Due for debate in Parliament as this issue goes to press, changes proposed by a government White Paper would radically alter transport administration in Britain and wipe out (eliminate) some £400 million in the British Railways' indebtedness.

Changement radical proposé pour le transport Britannique

Au moment où ce numéro est sous presse, le parlement mettra en discussion un livre blanc du gouvernement, proposant un changement radical dans l'administration du transport britannique et l'élimination d'environ £400 millions du déficit des Chemins de Fer Britanniques.

Änderungsvorschlag für das britische Transportwesen

Während diese Ausgabe in Druck geht, wird dem Parlament auf Grund des Weissbuches der Regierung ein debattenreifer Vorschlag für eingreifende Änderungen im englischen Transportwesen vorgelegt und etwa £400 Millionen British Railways-Verpflichtungen eliminiert.

Se sugieren modificaciones para el transporte británico

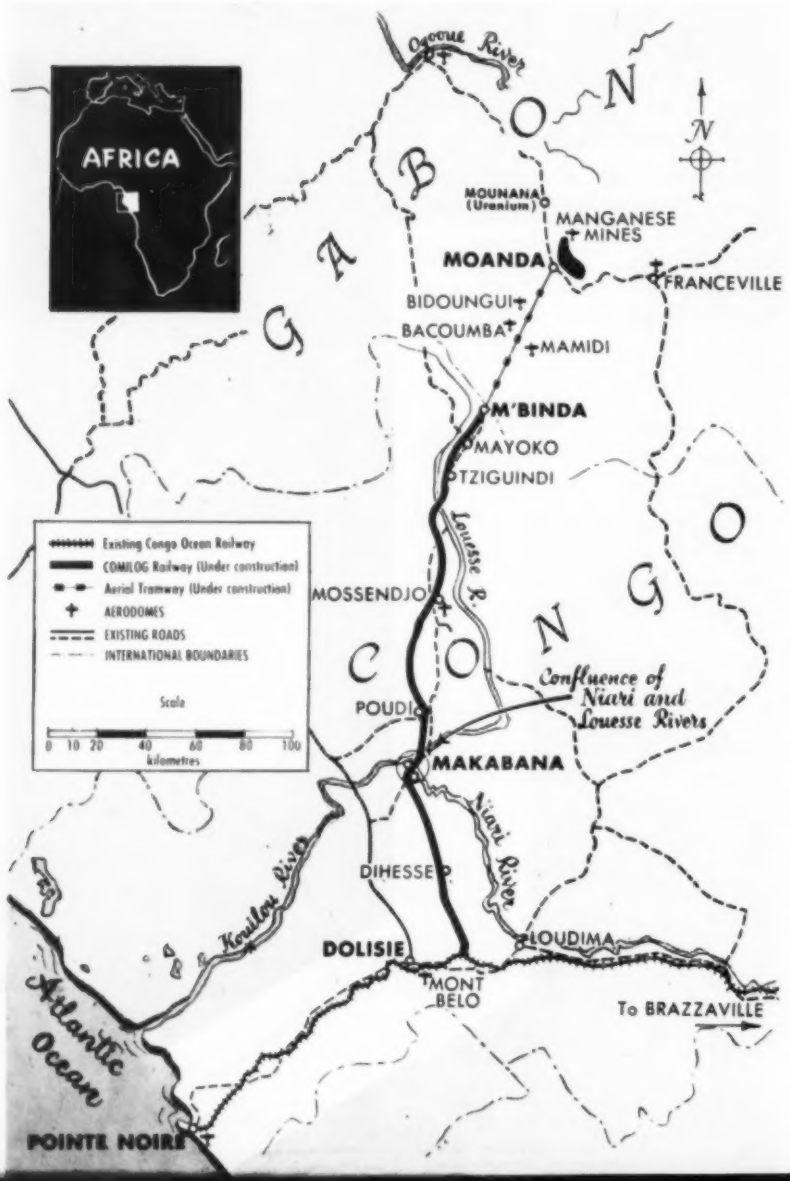
En el momento en que este número se da a la prensa, unas modificaciones sugeridas por el Gobierno reformarán la administración del transporte en Gran Bretaña y eliminarán unos 400 millones de libras esterlinas del endeudamiento de los Ferrocarriles británicos.

World Markets Get COMILOG

Work is progressing rapidly on the new 290-km railway being built in equatorial Africa for Compagnie Miniere de l'Ogooue (COMILOG). The rail line, in combination with a 76-km aerial tramway, will haul washed concentrates from a big, newly-discovered manganese deposit deep in the interior of the continent out to the seacoast for shipment to steel mills in Europe and the United States.

The new rail line will comprise a major extension of the existing Congo-Ocean railway which connects Brazzaville, capital of the new Republic of the Congo, with Pointe Noire on the Atlantic coast. Pointe Noire, one of the most important ports in the French Community, will serve as the outlet for the manganese ore shipments to overseas markets.

The route of the new railway runs in a northerly direction from Mont Belo, 30 km east of Dolisie station on the existing C-O line in the Congo. At M'Binda, on the border of the Gabon Republic, the terminal of the COMILOG line will connect with the aerial tramway, also presently under construction as part of the same project. The aerial tramway will carry the ore from a concentrating plant at the mine site, located on a 610-meter-high plateau at Moanda in Gabon, south to the railhead at M'Binda.



The entire COMILOG project represents a total investment of $89 million US of which the International Bank for Reconstruction and Development (World Bank) extended $35 million US in the form of a 6 per cent, 15-year loan, guaranteed by the Government of France, the Republic of Gabon and the Republic of the Congo. Lazard Freres & Co., New York, arranged private sale to institutional investors of about one-half of the World Bank loan. Funds derived from this loan are being used to pay for imported goods and services. Another loan of $7 million, from the Caisse Centrale de Cooperation Economique, a French Government agency responsible for making development loans in the French Community, and other funds provided by the shareholders are defraying all other costs of the undertaking.

Aerial Tramway

When completed this summer, the aerial tramway will be second in length only to that serving the lead and zinc mine at Boliden, Sweden, and will operate at a capacity of 150 tons an hour, or 850,000 tons a year. The aerial tramway is being constructed in 10 sections. Its towers, which will vary in height from 4 to 65 meters, will be spaced from 70 to 100 meters apart, depending on terrain. Five diesel plants along its route will provide the motive power. To maintain an even flow of ore to the railroad, provision is being made for ore stockpiles at two intermediate stations.

Economic factors, involving both time and capital expenditure, governed the decision to build an aerial tramway instead of continuing the railway over the northern section of the COMILOG route. A railway would have necessitated construction of a tunnel and two additional large bridges. As now planned, all of the 700 towers to carry the aerial tramway will be ready for operation by the summer of this year. Should annual ore production at Moanda ever exceed the 850,000-ton level, a decision would have to be made either (1) to expand the capacity of the aerial tramway or (2) to extend the railway from M'Binda to Moanda. The Moanda

Manganese

mine is now being prepared for commercial production and actual mining is due to commence early in 1962—about six months prior to expected completion of the railway.

Although construction was started only about a year and a half ago, a 45-meter swath has already been cut through the dense jungle the entire length of the route of both the railway and the aerial tramway and all earth-removal has been completed in the grading of the hilly terrain for nearly half the railway right-of-way.

Bridge Construction

Fifteen bridges will be required along the railway route. Three of these are of major proportions—175, 110 and 80 meters in length. A dozen other bridges will run from 3 to 40 meters in length. In addition, some 41 culverts of from three to four meters in diameter will be installed. One of the three major bridges has been erected across the Niari river at its confluence with the Louesse river and 40 km of track have been laid over the plains north of Mont Belo. The two other major bridges, both over the Louesse—one at the juncture of that river with the Niari, the other just south of Tziguindi—are expected to be ready when the track laying reaches these points. At least 150 km—and perhaps 200 km—of track are expected to be laid by July 1961 and earth removal completed for no less than three-quarters of the entire railway route.

In general, the rail route follows the course of the Louesse river valley north of Makabana and the Niari river valley south of that point. In both cases the valleys from Makabana are followed upstream.

One of the major construction problems of the current program involves smoothing out a route through numerous clay massifs which are separated from one another by deep ravines and are difficult to penetrate.

The equatorial climate is another deterring factor. Temperature hovers constantly at about 30° C with 100 per cent relative humidity.

Construction on the railway and aerial tramway is being done by La Compagnie Industrielle de Travaux (Enterprise Schneider), as prime contractor, the Utah Construction Overseas,

CONTINUED

Nouvelle Ligne pour le transport du Manganèse Africain

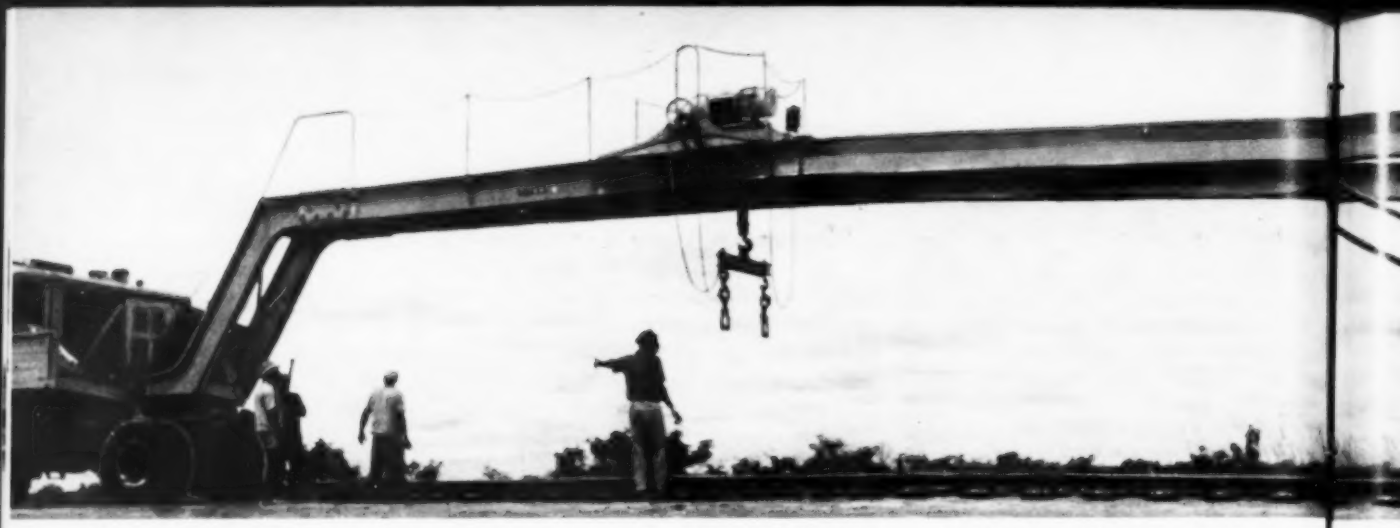
Pour amener le minerai manganèse des couches riches de la nouvelle république du Gabon, la COMILOG (Cie. Minière de l'Ogooue) pousse une nouvelle voie de 290 km au nord d'une jonction avec la ligne Congo-Océan dans la république congolaise à M'binda à la frontière du Gabon ainsi que le tramway à cable aérien, deuxième le plus long du monde, de M'binda aux mines de Moanda au Gabon. Outre le transport du minerai manganèse, la nouvelle ligne de COMILOG offrira une extension importante pour le service de transport publique en Afrique Equatoriale aux termes d'un accord avec la ligne Congo-Océan, qui maintenant relie Pointe Noire, le port de l'océan Atlantique avec Brazzaville à la rivière Congo. Aux termes de cet accord les trains COMILOG rouleront de Mont Belo sur la C-O jusqu'à Pointe-Noire; d'autre part Congo-Océan utilisera la nouvelle ligne pour assurer le service voyageur et de fret. La ligne COMILOG à force motrice diesel et construite avec l'aide des machines et méthodes les plus modernes, apportera une contribution vitale au développement économique des nouvelles nations africaines.

Neue Eisenbahn für afrikanische Manganerzförderung

Um Manganerz aus den reichen Lagern in der neuen afrikanischen Republik Gabun zu holen, baut COMILOG (Compagnie Minière de l'Ogooue) eine neue 290 km lange Eisenbahnstrecke nordwärts von einer Verbindung mit der Congo-Ocean-Eisenbahnlinie in der Kongorepublik nach M'binda an der Grenze Gabuns und der Welt zweitlängste Kabelbahn, von M'binda nach den Gruben bei Moanda in Gabun. COMILOGS neue Eisenbahn dient nicht nur der Manganerz-Ausfuhr sondern wird auch den Personenverkehr in äquatorial Afrika erheblich fördern; diese Bahn fällt unter das Abkommen mit der Congo-Ocean die den Atlantikhafen von Pointe Noire mit Brazzaville am Kongofluss verbindet. Nach dem Abkommen werden COMILOG-Züge von Mont Belo auf der C-O-Strecke bis Pointe Noire durchlaufen; ihrerseits hat Congo-Ocean Betriebsrechte auf der neuen Strecke für Personen- und Güterverkehr. Dieselgetrieben, mit modernsten Triebwerken ausgerüstet und nach neuesten Methoden gebaut, wird COMILOGS Eisenbahn zu dem Wirtschaftlichen Wachtstum der erwachenden afrikanischen Staaten einen lebenswichtigen Beitrag liefern.

Nuevo ferrocarril transportará manganesa africana

Para transportar manganesa de la nueva república africana de Gabón la COMILOG (COMPAGNIE MINIERE DE L'OGOOUE) va construyendo una nueva linea de 290 km al norte desde una bifurcación de la linea Congo-Ocean en la República Congo hacia M'binda en la frontera de Gabón, asi como uno de los funiculares más largos del mundo desde M'binda hacia las minas de Moanda en Gabón. Además del transporte de manganesa, el nuevo ferrocarril de COMILOG facilitará una extensión del servicio de pasajeros en Africa Ecuatorial y con este objeto se ha concluído un acuerdo con el FC Congo-Ocean que une el puerto de Pointe Noire del Océano Atlántico a Brazzaville del río Congo. Según el acuerdo COMILOG utilizará la linea C-O desde Mont Belo hasta Pointe-Noire; Congo-Ocean de su parte tendrá el derecho de utilizar la nueva linea para mantener el servicio de pasajeros y carga. La linea ferrocarril de COMILOG, dieselizada y construida con la maquinaría y según los métodos más modernos contribuirá en gran escala al desarrollo económico de las nuevas naciones africanas.



Titan straddle-type tracklayer on rubber tires lays 24-meter lengths of prefabricated panel track at a rate of one kilometer per day.
Poseuse de voie Titan du type à-cheval sur pneus pose longueurs de 24 mètres de travée de voie à raison d'un kilomètre par jour.
Titan Gleisleger, Gabelmuster, auf Gummireifen legt 24-m lange, vorgearbeitete Gleisrahmen mit einer Tagesleistung von 1 km.
Máquina de enrieladura Titan; con neumáticos; coloca tramos de vía prefabricados de 24 metros con una velocidad de 1 kilómetro al día.

850,000 Tons of Manganese, Annually, Will Help Supply

COMILOG CONTINUED

Inc., of Panama, and Taylor Woodrow (Overseas) Ltd., all working together as an integrated team. Especially at the outset of the job, a limited amount of construction material was flown in by air from Pointe Noire to small aerodromes near construction sites in the vicinity of the ore deposits and the railway and aerial tramway routes, at Mossendjo, Bacoumba, Bidoungui and Moanda. For the most part, however, men and materials have been moved to location over roadways (some primitive, and others of which had to be built especially for the purpose), or over the existing C-O tracks and subsequently over COMILOG tracks as they have been finished. Increasingly, in the future, the new railway will serve as the chief access route for materials, including rock ballast for the railway roadbed from a quarry near Mont Belo and sand for the embankments from pits along the rail route. The COMILOG labor force of over 3000 men are, in the main, natives of the country.

The project is, substantially, an earth-moving operation, and Caterpillar tractors are being used extensively for earth removal and scraping along the railroad right-of-way. There are 60 of these Caterpillar machines in use, including fourteen D9 tractors and bulldozers; fourteen D8 tractors and bulldozers; sixteen rubber-tired Dw20 tractors with No. 456 scrapers; ten rubber-tired No. 12 motor graders and six rubber-tired No. 463 scrapers. The equipment, imported from the United States and costing some $2 million US is providing an aggregate of 15,000 hp of push and pull energy on the project.

A specially devised straddle-type apparatus, powered by a diesel-driven truck mounted as a cab at the front of the apparatus, is being used to expedite track laying by the panel method. The tracks are being pre-assembled at Mont Belo before being installed in place. The pre-assembly includes the welding of two 12-m rails for each separate length of track. Metal ties are being used—1,650 to the kilometer—and these, too, are being

After track is laid, rails are welded by aluminothermic process.
Après la pose, les rails sont soudés-procédé aluminothermique.
Nach der Gleislegung, Schweissung nach dem Thermitverfahren.
Una vez la vía colocada, los rieles son soldados por aluminotermia.

Lengths of 32.67 kg/m rail are stored in COMILOG supply depot.
Entreposage COMILOG de longueurs de rail de 32.67 kg m.
In COMILOGS Vorratsdepot lagern Gleise in Längen von 32.67 kg/m.
Rieles de 32.67 kg/m de largo en parque de materiales COMILOG.

World Market Needs for Vital Steel Manufacturing Alloy

bolted in place as part of the pre-assembly. The 24-m sections of prefabricated track are piled four deep on railroad trucks and taken to location, at which point the straddle apparatus lifts the panels one by one, moves ahead the required distance, then lowers the track into place. Track is currently being laid at the rate of one kilometer a day, though with some interruptions.

Tracks and rolling stock for the COMILOG railway are limited to what the C-O can handle. Thus, the rail being laid for COMILOG is of the 32.67 kg/m section. Track gauge is 1.067 m. The 130 ore cars on order with Famillereux of Belgium are limited to 16 tons per axle, or 64 tons per car. Each will carry 47 tons.

Manganese mining and related activities will provide permanent employment for some 700 persons initially. Housing being established as part of the overall mining project includes installations at Makabana and M'Binda along the railway route: Bacoumba by the aerial tramway, and Moanda at the mine site. The latter two places are connected by highway to M'Binda.

According to the present program permanent railway stations are planned as follows, from south to north: Mont Belo, Dihesse, Makabana, Poudi, Mossendjo, Tziguindi and M'Binda. By arrangement with the Congo-Ocean COMILOG's trains will haul ore loads from M'Binda to Pointe Noire on the Atlantic coast, without transfer at Mont Belo.

For each round trip between M'Binda and Pointe Noire, the COMILOG trains will travel along 200 km of C-O track, and the C-O guarantees passage of COMILOG ores and other traffic required for the operation.

Reciprocally, the Congo-Ocean Railway has the right to operate its own passenger and freight trains over COMILOG tracks, to serve the needs of the mining industry of the region and, subsequently, the communities expected to rise along the route. C-O services will also help to develop the agricultural potential of the area, particularly its

CONTINUED

Bridge at junction of Niari and Louesse rivers is already built.
Pont déjà achevé au confluent des rivières Niari et Louesse.
Fertige Brücke beim Zusammenfluss des Niari- und Louesse-Flusses.
Puente cerca de la confluencia de los rios Niari y Louesse.

Seven of these General Electric (USA) U13C diesels will serve line.
Sept de ces diesels General Electric (USA) U13C seront employés.
Sieben dieser General Electric (USA) U13C Diesel werden eingesetzt.
Siete locomotoras diesel G.E. (USA) U13C servirán la linea.

Fourteen of these D9 tractors and bulldozers are among the 60 different Caterpillar machines in use at COMILOG construction sites.
Quatorze des tracteurs et défonseuses D9 parmi les 60 différentes machines Caterpillar utilisées aux chantiers de construction COMILOG.
Vierzehn dieser D9 Kleinloks und Planierraupen gehören zu den 60 verschiedenen Raupenfahrzeugen in den COMILOG Werkstätten.
Hay 14 de estos tractores y bull-dozer D9 entre las 60 diferentes máquinas Caterpillar utilizadas para la construcción de COMILOG.

COMILOG CONTINUED

timber resources. Congo-Ocean will erect all railway stations and sidings necessary for the service it will provide.

The plan is for one train of 40 cars to move in each direction over the track each day. Power for movement over the COMILOG will be provided by two locomotives; an additional locomotive will be added for operation over the Congo-Ocean track. The locomotives will be pulling against a 1.0 per cent grade when hauling full cars and a 1.5 per cent grade when the cars are empty, on COMILOG track. Curves are sharper and the gradient irregular on C–O track.

Seven General Electric U13C 96-ton, six-axle diesel-electric locomotives will provide power. Three of these are already in operation for construction work on the project, and the remaining four units are scheduled for delivery in mid-1961.

Mining Project

The manganese ore deposits at Moanda are located on four rock plateaus approximately 610 meters above sea level. This area is situated in the upper reaches of the Ogooue river, from which Compagnie Miniere de l'Ogooue, the mining concern, derives its name. The zone selected for initial exploitation is a kilometer-square area on one of the plateaus—that of Bangombe—containing 9 million tons of 49.7 per cent manganese. This zone is just a small part of the total mineralized area on the Bangombe plateau alone. Equally large deposits are also known to exist on the near-by Okouma plateau. Further exploration will be needed to determine additional ore deposits in the region.

The Moanda deposits consist largely of manganese-bearing boulders, fragments and grains imbedded in a sandy clay matrix. Mining will be by the open-pit method. The ore lies in a bed 4 to 6 meters thick and can be easily removed by drag-lines. A processing plant is being built at the mine site to crush, wash and screen the ore. Other facilities at the same location will include a workshop, electric power plant, and office building. To a great extent, the mining and processing of the ore will be mechanized.

Conservatively estimated to contain 150 million tons of commercial ore, the mineral deposits at Moanda constitute one of the largest sources of manganese in the world—comparable to those in India and Brazil, which have been mainstays of supply to nations outside the communist bloc for some years. The Soviet Union is estimated to have two-thirds of the known world reserve of one billion tons of this mineral. In an age when steel is of great importance to the world, manganese, a metallic element which is added to steel to increase its toughness, is critical to the industry which purchases some 95 per cent of the total output. Manganese is also used as an alloying metal with copper and aluminum, and with copper, tin and zinc to produce manganese bronze and manganese brass. Compounds of manganese are used in paints, electric storage batteries, and in medicinal and germicidal preparations.

Western Europe's annual requirements for manganese, which now stand at 1.5 million tons, are expected to increase to about 2 million tons in 1962, thus providing a ready market for the entire output of the rich ores COMILOG will be able to make available from the very outset of its operation. Additionally, one of COMILOG's principal stockholders, United States Steel Corp., has an option for a substantial portion of the ore concentrates the mine will yield.

Pointe Noire, Atlantic coast terminal of the Congo-Ocean Railway and the port of departure for shipments of COMILOG ore to overseas markets, serves as the entrance and outlet to a vast territory in the interior of Africa. Currently one of the most modern ports in

the French Community, its present import traffic exceeds that of all other ports in the area formerly known as French Equatorial Africa. Its traffic increased from 100,000 tons in 1947 to 550,000 tons in 1958. Port facilities at Pointe Noire include 1,100 meters of docks and 38,000 square meters of sheds and warehouses. COMILOG has been assigned one of the docks in the port and is preparing to install adequate storage and mechanical loading facilities for ore.

The largest stockholder in COMILOG is the United States Steel Corp., with holdings of 49 per cent. Next largest is the Bureau des Recherches Geologiques et Minières (formerly the Bureau Minier), a French Government corporation with responsibility for mineral exploitation and development overseas, which holds 22 per cent of the stock. The Société Auxiliaire du Manganese de Franceville, owned equally by Compagnie de Mokta (MOKTA), Banque de Paris et des Pays-Bas, and Compagnie Minière de l'Oubangiu Oriental, has a 15 per cent holding. MOKTA holds another 14 per cent outright. COMILOG was formed originally on 29 September 1953, after initial exploration by Bureau Minier and United States Steel Corp. disclosed the presence of a large manganese ore body of excellent quality near Franceville.

World Market CONTINUED

is drawn from an English Electric EM27L gas turbine specially developed for direct mechanical drive, with a separate power turbine, simple reverse and reduction gear box. The GT3 is the third gas-turbine locomotive to run on British Railways, and is expected to give valuable experience in operation of that form of motive power.

▶ *Finnish State Railways.*—Placed orders for 1370 KE brake valves for use on freight cars with Knorr-Bremse of Munich. The railways have adopted the KE brake as standard.

▶ *Hellenic State Railways.*—Have awarded to Ferrostal A.G., Essen, Western Germany, a contract for 10 three-unit diesel trains powered with 1600-hp Maybach diesel engines. The new trains will be built by Maschinenfabrik Esslingen. Their order follows an earlier contract for seven three-unit trains, delivered in 1959.

▶ *Hungarian State Railways.*—Have bought $7,300,000 worth of electric locomotive equipment in the United States, for a railroad electrification program. Have also issued an inquiry in Western Europe for 20 2,000-hp diesel-electric locomotives estimated to cost about $2,800,000, and have ordered locomotive connecting rods valued at $336,000 from Great Britain.

▶ *India.*—The Railway Board anticipates need for an additional allocation of between $80,000,000 and $126,000,000 to carry out the third five-year plan. Proposed projects include construction of a diesel locomotive plant; building of 80 km of line to Haldia port; and additional facilities to meet demands of steel plants at Durgapur, Rourkela and Bhilai, and of a proposed plant at Bokaro. Indian railway achievements, to date, in meeting increased traffic demands have been described as "impressive." They include electrification of 160 km of line; work on electrification of another 924 km; and establishment of a car factory which is turning out passenger car bodies at the rate of 52 per month.

▶ *Iranian State Railways.*—Have received bids for supply, delivery and installation of short wave dipolantennas with reflectors; also for supply of about 25 tons of copper-coated double metal wire.

▶ *Iraqi Republican Railways.*—Will place orders for 15 diesel locomotives for meter-gauge lines. Also scheduled for purchase are 150 open freight cars, 60 air-conditioned passenger cars, a dining car, and 40 water tank cars. Work is to be started at Margil on the construction of housing for skilled and unskilled workers at an estimated cost of more than 500,000 Dinars; 2256 houses have been built by the Railway Development Board since the inauguration of its housing program in July, 1958.

▶ *Korean National Railways.*—Have purchased 11 passenger coaches from the New Haven (US). Prior to shipment to Korea, the cars were repaired by the Rail & Industrial Equipment Co., Landisville, Pa.

▶ *Luanda Railroad.*—As part of Angola's second six-year national development plan, the gauge of the Luanda Railroad's main line from Luanda to Malange, 426 km, and of its Dondo branch, 55 km, is being widened from 1 m to 1.67 m. Preparatory work on the gauge change

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Canadian National Moves Ahead

CN adopted this new trademark in 1960.
CN a adopté cette nouvelle marque en 1960.
CN führt dieses neue Emblem seit 1960.
CN ha adoptado esta nueva marca en 1960.

Despite the low traffic levels that plagued the railway industry throughout North America during 1960, the Canadian National continued to push ahead with a program of modernization aimed at increasingly efficient operation. This was emphasized in a year-end statement by Donald Gordon, chairman and president of the CN.

To meet Canada's current and future transportation needs by constantly improving the efficiency and flexibility of its service, the Canadian National, in 1960:

- Reorganized its administrative set-up.
- Modernized its sales organization.
- Improved its communications.
- Advanced technologically.
- Achieved greater integration of its rail and highway services.
- Presented to the public a new trademark designed to symbolize its role in the movement of men, materials and messages throughout Canada.

The CN's improvements in plant and methods contrasted sharply with its revenue picture for the year. Freight revenue, in 1960, was more than 7 per cent below that for 1959; passenger revenue was down about 6 per cent. Gross revenue of Canadian National Telegraphs advanced by nine per cent, to reach a new high, while hotel income showed a small increase. Overall, however, revenues dropped by an estimated 6.5 per cent, leaving the system in a disappointingly large deficit position at the year's end.

Increased shipments of ores and concentrates, pulpwood, and miscellaneous manufactured iron and steel products were more than offset by declines in movement of grain, flour and other grain products, and of bituminous coal and other products of mines.

The railroad's organizational structure was streamlined to decentralize authority, modernize administrative techniques and provide at all levels an integrated sales and operating staff. As of 1 Jan. 1961, three former operating regions were superseded by five new regions—Atlantic, St. Lawrence, Great Lakes, Prairie and Mountain. These will be further subdivided in 1961 into 19 geographic areas as "business units."

The sales department also was realigned to improve its ability to sell railway traffic. Groups of specialists were organized to study rate and tariff-making techniques and equipment and customer service; to forecast traffic; to set sales objectives, and to conduct market surveys. The freight rate staff also was changed to focus specialist attention on international, Canadian and transcontinental rates, and to study particular commodities.

A new branch of the sales department —Merchandise Services—was set up to make the most efficient use of both rail and highway transport. Amalgamation of both express and less-than-carload freight under this branch is under study.

That there is a demand in Canada for integrated rail and highway services was pointed up the fact that CN's piggyback –truck-trailer-on-flat car–operation produced an increase of 11 per cent in tonnage and 25 per cent in revenue in 1960 as compared with 1959. There was also a marked increase in movement of household goods by common carrier piggyback; this service was extended to additional pairs of cities across Canada.

The railroad expanded its highway services by some 24,000 km through purchase agreements with four trucking companies, and took an option on a fifth.

Technological improvements included completion, in April, of a 10-year dieselization program, and the opening, in November, of a new electronic hump classification (marshaling) yard at Moncton, New Brunswick. A similar yard at Montreal will go into operation sometime this spring, and work is under way on others at Winnipeg and Toronto.

Upgrading of rolling stock and testing of new equipment and methods continued during the year. To obtain maximum use of locomotives, motive power control bureaus were established at Moncton, Toronto and Winnipeg, with a complex system of communications between them.

Equipment purchases included 80 new low-alloy steel flat cars; 75 cars for the narrow-gauge Newfoundland line, and 188 trailers, including 25 refrigerated trailers, for the company's piggyback operation.

A new 83-km branch line between Optic Lake and Chisel Lake, in northern Manitoba, built at a cost of $8,800,000, was opened in September to serve mines of the Hudson Bay Mining & Smelting Co. It was announced that $9,660,000 would be spent in 1961-62 to build a 96-km branch to serve Mattagami Lake mines in northwestern Quebec. This will branch off from the Chibougamau line which was completed in 1959.

Centralized traffic control was installed on another 1350 km of track, mostly in Ontario and Quebec. In 1961, CTC will be added between Winnipeg and Melville, Saskatchewan, and between Monk and Levis, Quebec. The latter installation will complete signaling of one route between Montreal and Halifax.

The CN's new 17-story headquarters office building in Montreal is expected to be ready for occupancy by 31 May.

Integrated data processing, which will play a major role in the operation of the four new yards, is being successfully applied also to other aspects of CN operations, including car tracing, revenue accounting, traffic research and operating and sales statistics.

CN Continue son Progrès

Pour augmenter son redement de fonctionnement le Canadian National a continué à pousser son programme de modernisation en 1960, malgré de nombreux obstacles.

CN setzt Entwicklung fort

Zur Erhöhung ihrer Betriebsleistung fährt die Canadian National, trotz vieler Hindernisse, mit ihrem Erneuerungsprogramm 1960 fort.

CN continúa sus progresos

Para aumentar la eficacia de sus operaciones, la Canadian National fomentaba en 1960 su programa de modernización, a pesar de muchas dificultades.

In a brief, submitted in November, to the Royal Commission on Transportation, the CN pointed out that, despite progress during the year, "much remains to be done before the company can bring its efficiency of operation to the point where it will be fully competitive with other forms of transportation." The brief stressed the need for major changes in legislation governing railroads to enable them to adapt to changing conditions in the transportation market.

Despite the year's severely reduced revenues, Canadian railways were faced with new wage demands from their non-operating employees. A threatened nation-wide rail strike in December was averted when the Canadian Parliament passed emergency legislation providing for maintenance of railway service until 15 May 1961.

The government's intervention in the wage dispute, plus the Royal Commission hearings, brought into sharp focus the pressing problems faced by Canadian railways. The burden they bear through enforced maintenance of low 60-year-old statutory and related rates for movement of grain and grain products has become relatively heavier in the light of 1960's reduced passenger and general freight traffic.

The government has said that no general freight rate increases will be permitted until the Royal Commission has reported; yet economies achieved through capital expenditures and increased efficiency are largely absorbed by higher costs for labor and materials.

Permanent-Way Show Scheduled for March

Between 20 and 25 March the attention of permanent way engineers and equipment suppliers will focus on the village of Elst in the Netherlands, site of an international exhibition of permanent-way plant and equipment sponsored by the Netherlands Railways in cooperation with the Federation of German Railway Engineers (VDEI).

The yearly VDEI exhibition has become a recognized international presentation of the latest developments in the field, and railways from 11 nations will take part in the Elst event—Austria, Belgium, Denmark, France, Great Britain, Italy, Luxemburg, The Netherlands, Sweden, Switzerland and West Germany.

Rather than placing the emphasis on the very latest developments, railways themselves will exhibit equipment that has been in use for some time and given satisfactory results. Among the railway exhibits will be a weed-killing train of the Netherlands Railways and a weed-killing car from the German Federal; an NS rail-grinding train; Dutch and German boarding trains for gang personnel. NS will exhibit its remotely-controlled propane-fueled heaters for turn-out points together with a special propane tank car for refueling the installations, and its latest zig-zag design of steel and concrete sleepers. Dutch and German trains for permanent-way personnel training will be shown, and the motion-picture units of these trains will show British, Dutch and German training films during the exhibition.

Displays by manufacturers will include tamping-lifting machines by Plasser and Theurer (Austria), Matisa (Switzerland) and Windhoff (Germany, built under license from Railway Maintenance Corporation of the USA); sleeper-bed scarifier and small measuring car by Matisa; ballast-cleaning machine for shoulder cleaning by Plasser and Theurer; and a special unit for the removal of ballast from between sleepers built to Netherlands Railways specifications by Windhoff.

Small tools shown will include bolt-running, sawing, and drilling units by Plasser, Matisa, Robel (West Germany), and Stumec (France), as well as hand-held vibrating tools by Wacker and Vibromax (West Germany) and Jackson (France-USA).

All equipment will be placed on track for working demonstrations in the Elst freight yard.

Special groups visiting the exhibition will include a large party of VDEI members on Friday 24 March, and members of the British Permanent Way Institute on Saturday 25 March. In connection with the event International Railway Journal will publish several special permanent-way features in its March 1961 issue, and complete coverage of the event at the earliest opportunity.

Elst is located between Arnhem and Nijmegen and has frequent train service from both points.

Manila Railroad to Expand, Modernize

To celebrate its 68th anniversary, the Manila Railroad, in the Philippine Islands, is embarking on a two-year, multi-million-dollar expansion and modernization program.

According to General Manager Teofilo A. Zosa, the Manila Railroad plans to spend some $7,000,000, during the next two years, on purchase of modern rolling stock and improvement of fixed facilities.

In addition, it is expected that about $3,000,000 will be made available for construction of a $2,000,000 station building at Tutuban and other projects.

Under its modernization plan, the MRR contemplates purchase of 10 new 700-hp diesel-electric locomotives, to supplement 10 others purchased from General Electric Co. on a deferred payment plan. Other anticipated equipment purchases include 10 first-class air-conditioned coaches; 15 third-class coaches; 14 baggage cars; 22 rail-motor cars for commuter service; four self-refrigerated cars for perishable cargo; and

MRR Approves Profit-Sharing Plan

A profit-sharing plan for Manila Railroad Co. employees has been accepted by General Manager Teofilo A. Zosa, and approved by the railroad's board of directors. The plan was proposed by Philippine Labor Secretary Angel M. Castaño as a means of settling a labor dispute.

The proposal provides that:

- MRR employees will receive 50 per cent of annual net profits below 400,000 Philippine pesos (about $200,000 US) which may be realized by the state-owned railroad firm.
- They will be entitled to 40 per cent when the net profit is between 400,000 and 600,000 pesos.
- They will receive 30 per cent if the net profit realized by the railroad exceeds 600,000 pesos.

The plan as finally worked out was a compromise between the labor secretary's original proposal, that employees be given a straight 50 per cent share of all profits, and a railroad proposal, that they be given 30 per cent, pro-rated according to length of service and rate of pay. In return for adoption of the plan, the union representing the employees has agreed to postpone for 15 months its demand for a revision in the pay scale of its member-employees.

First step in carrying out the new profit-sharing plan was payment to more than 6,000 employees of a Christmas bonus of 7 per cent of the company's net profit of 1,619,706 Philippine pesos (about $800,000 US) for its 1959–60 fiscal year.

two vertical presses for printing tickets and other forms. It is currently receiving five first and third class dining cars from Japan.

Some 120 km of existing rail will be replaced with new rail and accessories; and about $80,000 will be assigned to purchase of some 300 metric tons of steel for construction or repair of bridges.

The plan also envisions improvement in the services and facilities of two MRR subsidiaries—the Luzon Bus Lines and the Benguet Auto Lines. They will receive new truck chassis units, new diesel and gasoline engines, and 20 new automobiles to improve service between Damortis (La Union) and Baguio.

The modernization program is being undertaken because the state-owned railroad company finds that inadequate facilities are hampering its performance of essential public services. The general manager, in fact, has been quoted as saying that the railroad can currently cope with only about 60 per cent of the traffic it should be handling; and that, because of inadequate facilities, it "is throwing away good business" to the tune of about $5,000,000 a year. He added that the MRR is hardly able to cope with the demands of sugar planters alone; and that huge stocks of lumber, logs, copra, tobacco and firewood cannot be loaded because of lack of flat cars and motive power. The new facilities are expected to help the railroad contribute effectively to the government's industrialization program by providing fast, cheap and adequate transportation.

The situation in passenger service is similar to that in freight. The MRR derives from 65 to 70 per cent of its revenue from passengers; the three first-class express trains on its northern and southern lines are normally booked to full capacity weeks in advance.

According to the 1960 edition of "World Railways," the MRR extends from the city of Manila north to Cepoc Compound and south to Legaspi on the island of Luzon, which is the largest of the Philippine group. It also operates a number of branch lines from both main stems.

It has a total of 1,019 route-km and 1,212 track-km, all of 1.067-meter gauge. It operates 80 steam and 42 diesel locomotives; 34 diesel rail cars and 12 trailers; 233 passenger-train cars and 1,793 freight-train cars.

In the latest year for which figures are available (fiscal 1959–60), the railroad carried 1,141,062 tons of freight and express on 14,292 trains, and 9,442,432 passengers on 31,087 trains. Its highway subsidiaries, in addition, handled 32,646 tons of freight and carried 3,760,083 passengers.

Short Lines . . . . . .

"The Time Has Come, the Walrus Said . . ."—To speak of many things is almost a necessity in reporting present-day railway affairs, and some of the things spoken of can seem rather far removed from everyday railway conversation—such as research laboratories (p. 24), psychotechnics (p. 11) and gasworks (p. 38). Not to mention microwave transmission theory (p. 20) and photogrammetry (coming next month). In view of the number of railways that operate them, it's reasonably certain that we'll be discussing ships; I don't really expect it, but I wouldn't be too surprised if tomorrow's mail brought a manuscript on sails and sealing wax.

Disclaimer — The opinions of some friends and associates to the contrary notwithstanding, the illustration on page 57 is **not** a portrait of the publisher.

No More Locomotives? — I like locomotives, be they steam, diesel or electric, but judging from the volume of trainset and rail car material that comes across my desk, an old and affectionate friendship may be coming to a close. This month IRJ takes a vacation of sorts from self-propelled passenger cars (if you can overlook six in assorted shapes and sizes on p. 32 and two more on p. 14) but they'll be back in force next month with a report on some recent Swiss trainsets. Meanwhile, locomotives seem to have freight traffic pretty much to themselves—at least for now; the Japanese have motorized a box car, and who knows where it will all end.

Unforeseen Difficulties — Good friend and former colleague Sy Kashin of the New York Central suggests an unexpected by-product of the railway mergers in the US (IRJ January p. 64). He envisions names like "New York, Norfolk, Pittsburgh, Wabash Western and Great Northern Pacific," and suggests that the current trend toward extra-long freight cars may simply be a matter of fitting in the names and not the result of any inherent design advantages.

PUBLISHER

Letters to IRJ

Carlisle, England
10 January, 1961

To the Editor:

We are grateful for the excellent editorial feature on pages 26 and 27 of your January issue.

Unfortunately, in the conversion of foot and pound units into metric units, a number of rather serious errors have crept in. Lest your readers should be under any misapprehension as to the capabilities of this large railroad wrecking crane, we herewith point out these errors:

Operating temperature, for —42° C. read —51°; minimum radius, 45.6 meters rather than 49; main hook lifting speed, 1680 cm/min (1680 cm/sec); maximum capacity of auxiliary block, 51,000 kg (5100 kg); capacity of whip hook, 12,650 kg (1265 kg); length over end sills 11.2 m (12 m); axle load in running condition, 30,800 kg (30,650 kg).

Apart from these unfortunate errors, we consider the presentation of this article to be very good.

B. W. F. Crofts
Cowans, Sheldon and Co., Ltd.

[Our apologies to Cowans, Sheldon for the errors noted, which can stand as a good argument for a truly uniform system of measurement (see "World Poll," p. 52) and for more careful use of the editorial slide rule. — Editor.]

Products of Interest

New Air-Spring Busses Introduced

Nouvel autobus Scania-Vabis — suspension à coussins d'air.
Neuer Scania-Vabis Bus hat Luftkissen.
Nuevo autobús Scania-Vabis tiene suspensión de aire.

New Scania-Vabis busses suitable for railway feeder-bus operations as well as local city service incorporate eight air-spring units of nylon-reinforced synthetic rubber. First Scania-Vabis vehicles to use air springing, the new series was introduced in January after trials of a prototype unit by Stockholm Tramways, which received the first 30 production units. The rubber air-spring bellows, which replace conventional springs, adjust automatically as the load of the bus changes. *AB Scania-Vabis, Södertälje, Sweden.* **IRJ 1**

Indicator Records Diesel Firing Pressure

"Diesindicator" enregistre pressions correctes d'allumage diesel.
"Diesindicator" gibt den Zünddruck der Dieselloks genau an.
"Diesindicator" registra presiones de encendido de motores diesel.

The "Diesindicator" is a reliable and consistent peak pressure indicator which accurately registers peak and initial pressures on slow, medium and high speed diesel engines where access to the combustion chamber is provided. It is quickly applied, and can be left connected to the engine. It comes with both male and female connections and a gage graduated both in lb/in² and kg/cm². *Dunedin Engineering Co., Ltd., 73–75 Mortimer st., London, W. 1, England.* **IRJ 2**

Oil-Hydraulic Re-railing Tackle

Agrès de relevage soulève douze tonnes; facile à manier.
Öl-hydraulische Aufgleisgeräte 12 t; leicht hantierbar.
Mufla hidráulica de levantamiento; 12 t; manipulación fácil.

A light, easy-to-handle oil-hydraulic re-railing tackle can be used for quick clearance of blocked railroad or tramway lines, or industrial or mine tracks. It can exert a lifting power of up to 12 tons, to a height of 700 mm. It utilizes lifting cylinders actuated by hand-controlled triple valves, and re-railing bridges made of light metal, with 60-ton bearing power. *Maschinenfabrik Deutschland Aktiengesellschaft, Dortmund, Western Germany.* **IRJ 3**

Mine Locomotive Folds, Adjusts for Gauge

Locomotive de mine Greensburg se plie, s'adapte à l'écartement.
Greensburg Grubenlokomotive passt sich der Spurweite an.
Locomotor minero Greensburg se ajusta a la trocha de vía.

The Greensburg trammer-type battery-powered mine locomotive is said to offer maximum horsepower for size and weight. It folds to fit a standard mine cage, and can be adjusted for any track gauge berween 46 and 61 cm. Controls are accessible even when the operator's compartment is folded. Other special features include removable end bumpers, two-way headlight, improved ratchet lever brake and deadman control. *National Mine Service Co., 2530 Koppers bldg., Pittsburgh 19, Pa., USA.* **IRJ 4**

Railcar Reverser Gives Continuous Drive

Inverseur Rolls-Royce permet la conduite continue dans les deux sens.
Rolls-Royce Schienenwagen-Wender mit zusätzlichem Dauerantrieb.
Inversor para Rolls-Royce, transmisión continúa en ambas direcciones.

The Rolls-Royce Type CG 100 railcar reverser gives positive and continuous drive in either direction. It is suitable for underfloor and other installations, and is usually mounted integrally with a Rolls-Royce hydrokinetic torque converter. A handle in the driver's compartment selects forward, neutral or reverse. On the reverser itself any of these positions may be manually selected. *Rolls-Royce, Ltd., Railway Traction dept., Shrewsbury, England.* **IRJ 5**

Monorail Tamper Spots, Smooths Track

Bourreuse Jackson monorail à usage multiple dans l'entretien.
Jackson Eingleis-Stampfe für Streckenwartung bevorzugt.
Bateador monorriel Jackson para el mantenimiento de la vía.

A monorail tamper, with a wide range of uses, is described as "ideal" for track spotting and smoothing, yard track maintenance, and secondary maintenance programs which do not justify cost of standard dual-rail tampers. Movement from tie to tie and operation of workhead are hydraulically actuated and controlled. There is a power ram turntable for quick transfer to opposite rail, and a truck towing attachment. *Jackson Vibrators, Ludington, Mich., USA.* **IRJ 6**

WORLD POLL

Does Standards Confusion Hurt the Railway Supplier?

This month International Railway Journal continues its survey of complications resulting from multiple screw thread standards and the existence of two unrelated systems of measurement. Following the survey of railway companies published in the January issue, IRJ this month reviews the replies received from members of the railway supply industry.

L'International Railway Journal de ce mois continue ses études des complications résultant des étalons multiples de filets de vis et l'existence de deux systèmes de mésurage n'ayant aucun rapport. Comme suite à l'étude de sociétés de chemins de fer parue dans l'édition de janvier, l'IRJ de ce mois donne un aperçu des réponses reçues de membres de l'industrie fournisseur des chemins de fer.

In diesem Monat gibt International Railway Journal eine weitere Übersicht über die Schwierigkeiten durch die unterschiedlichen Gewindenormen und die zwei, unzusammenhängenden, Masseinheiten. Anlässlich der Berichte von Eisenbahngesellschaften in der Januarnummer, veröffentlicht IRJ dieses Mal die eingegangenen Antworten von Mitgliedern der Eisenbahnlieferungsindustrie.

Este mes la International Railway Journal continúa su informe sobre las complicaciones que resultan de la multiplicidad de las normas de rosca y de la existencia de dos sistemas diferentes de medición. Basándose en el resumen de las compañías ferroviarias publicado en el número de enero, IRJ comenta este mes las respuestas recibidas de varias casas suministradoras de la industria ferroviaria.

●

• **ALCO Products:** English measurements, American Standard screw threads. Will not build to other standards and problem not regarded as serious. "In general the only problem that exists is in screw threads, and for the most part the railways either purchase from us, purchase taps and dies to make their own modifications, or, where possible, use the nearest standardized bolt available to them."

• **British United Traction:** Has adopted unified screw thread series in place of Whitworth, finds this eliminated problems in its case.

• **Budd Company:** Uses only English measurements and American standard threads, finds problems of standardization "Have not been a problem in obtaining orders outside U.S.A."

• **Cockerill-Ougree:** Metric measurements are standard, but Whitworth threads are now used and "We incline to think we shall switch to metric as future standard." English measurements are converted to metric for production, threaded items either purchased or manufactured to suit the order.

• **Esslingen:** Metric and Whitworth threads used; metric measurements standard but "Had to adopt the so-called 'English' measurements to get orders." Problem most severe in Great Britain, Commonwealth countries, and countries with strong British influence. Tries to pursuade customers to use the metric system. "The new free countries (Africa) should be induced like India to adopt the metric system but the main obstacle, conservative countries like Great Britain and U.S.A., should start first."

• **Societe Franco-Belge:** Metric standards throughout, "With some exceptions." Some problems in sales but "They diminish." U.S. and Commonwealth countries present greatest obstacle. Can build to non-metric standards and has supplied locomotives to British design; measurements not much problem but screw threads are. Strongly recommends adoption of metric standards: "The complication of the English system is no longer bearable no matter what the metaphysical arguments in its favor may be."

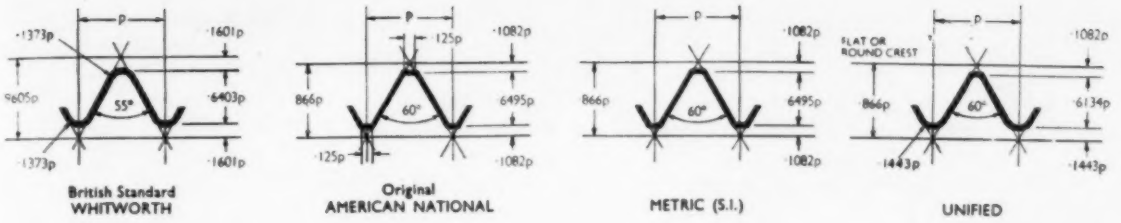
• **General Electric (U.S.A.):** Like other U.S. manufacturers, uses inches and American Standard threads, finds the problem most severe in nations that are already highly developed industrially or which have long-standing trading habits with specific industrial countries. Could build to metric standards "If it were essential. In a complex machine like a locomotive which has a very large number of component parts it is rather impractical to carry out a change of standards to the ultimate degree."

• **Gloucester Railway Carriage and Wagon:** Problems "Become more serious as competition increases. We may have to offer metric systems in the future." Now use English measurements and "some metric," Whitworth threads; regards problem as most acute in North and South America where American Standard threads predominate.

• **Hansa Waggonbau:** Use of metric measurements and threads has required conversion of all "English" orders to metric measures for production purposes, a solution not regarded as ideal. Recommends universal adoption of metric system, but to minimize problem meanwhile tries to persuade customers to accept firm's standards on all parts not requiring complete interchangeability.

• **Hunslet Engine Company:** English measurements and Whitworth threads present "No problem. We can work to metric dimensions but do not carry equipment for these sizes."

• **Kisha Seizo Kaisha:** Metric system used, Whitworth threads standard in structural work for sizes over 9 mm, metric threads for smaller sizes, but engines and traction equipment use metric only. Can work to either metric or English dimensions, threads as required, but hopes to adopt metric exclusively where full interchangeability is not



The Robertson Guide to
World Standard Screw Threads

required. Notes problem in securing standard rolled steel sheet and sections to other than metric dimensions, substitutes metric standard sizes closest to customers' inch specifications.

• **Klöckner-Humboldt-Deutz:** Metric measurements and threads present a definite sales problem, especially in South and Central America, former British colonies. Cannot work to other standards, and tries to sponsor metric system; equips service stations with tools, parts and machinery to fit own products. "India, Pakistan and other countries have already changed from the English system to the metric one. We hope other countries will follow."

• **Maschinenfabrik Augsburg-Nürnberg (M.A.N.):** Metric measurements and thread standards are employed as a general rule, but can work to other standards as required. Finds problems present difficulties in the form of greater expense to the manufacturer in such respects as "The need for larger stocks of tools and measuring instruments, special manufacture of standardized parts, a certain amount of extra work involved in preparing workshop drawings in accordance with foreign systems of measurements and in providing these drawings with two sets of dimensions." Would recommend uniform metric system of measurements.

• **North British Locomotive Company:** Employs both metric and English measurements as standard, Whitworth, Unified and Metric threads. As a result, no problems except that "The problem is serious so far as the supply of auxiliary equipment is concerned."

• **Nydqvist and Holm (NOHAB):** Metric measurements; metric, Whitworth and American Standard threads—no problems in sales. "Being associated with General Motors we often have difficulties when using U.S. equipment with 'English' measurements together with parts having metric measurements."

• **Sulzer Brothers:** Metric or English measurements as required, Whitworth and metric threads; finds standards are a problem on occasion in selling to some eastern European countries. "It can be difficult for engines made by our licensee in England to be sold on the Continent." Recommends adoption of metric system.

• **Swiss Industrial Company (SIG):** Metric measurements, both metric and Whitworth threads as required. No problems in sales, can work to English measurements if required. "Metric system is given preference."

• **Swiss Locomotive and Machine Works (SLM):** Metric measurements, Whitworth and metric threads. No problem as a general rule, though produces in metric system only.

• **Teikoku Car and Mfg. Co.:** Metric measurements and both metric and Whitworth threads used, can work to English measurements by conversion, either thread standard as required. "We hope metric standard of measurement will be employed throughout the world."

• **Tokyu Car Manufacturing Company:** Metric measurements, both metric and Whitworth threads used. Converts English measurements for production. Can build to other standards as required, but reports same problem as KSK with regard to standard rolled steel sheets and sections. Substitutes nearest metric standard size. Recommends adoption of metric system exlusively.

• **Werkspoor (VMF):** Metric standard, metric and Whitworth threads used as required. Only problem to date has been in the drawing office providing English measurements for South African locomotives. A sales problem in any country where other than metric standards of measurements are employed. "In principle it is possible to use any standard; however, this will involve extra costs, thus higher prices and less sales possibility. Therefore it is always advisable to bring the standards back to a minimum."

• **D. Wickham and Company:** English measurements, Whitworth threads. Will work to metric measurements including screw threads; finds problem minimal at present, "As most of the railways with which we do business are originally British-owned." Finds present tendency is for railways to request Unified screw thread standards. "Apart from India, where we believe the metric system is to be employed, and Formosa which has specified Unified threads, we have had no difficulty in working to English standards and threads. We do little business with the Continent where perhaps the question of metric thread might well arise."

CONTINUED ON PAGE 62

and construction of new stations at Salazar, Lucala and Malange, has cost about 150,000 Contos ($5,244,000 US). The change in track gauge also involves changing wheel gauges on about 400 cars and locomotives, some of which were built to the 1.67-m gauge and then temporarily narrowed to the 1-m gauge pending change in track gauge.

▶ *Material y Construcciones SA.*—Seeks a licensing agreement for the manufacture of rail anchors to be furnished to the Spanish railway system (RENFE). Interested firms should contact the firm at Plaza de la Independencia, 8, Madrid.

▶ *New Zealand Government Railways.*—Have awarded a contract for 12 G-12 1425-hp A1A-A1A diesel-electric locomotives to General Motors Diesel, Ltd., of Canada.

▶ *North Western (Pakistan).*—Has bought from Western Germany 24 diesel rail cars and trailers for use in short-distance service from Lahore, Khanewal and Samasata.

▶ *Queensland Railways (Australia).*—Have called for bids for construction of bridges and associated works between Hughenden and Duchess, on the $67,500,000 Mt. Isa line rehabilitation project. Have received bids for construction, at an estimated cost of $2,250,000, of the Burdeking River bridge, one of the major units of the Mt. Isa work. The bridge will include 12 22-m girder spans and six 76-m truss spans. Estimated work involved includes: Foundation excavation—7,700 m^3; reinforced concrete for piers and abutments—6,900 m^3; embankment construction—129,000 m^3; structural steel—2,720 tons; trackage—1.6 km.

▶ *Rhodesia Railways.*—A local color-light signaling system controlling all train movements has been put into operation at Dett. CTC on the North line will soon be in operation between Livingstone and Matetsi. The Matetsi-Thomson Junction section was scheduled for completion by the end of 1960, to bring all 640 km between Gwelo and Livingstone under CTC, with local color-light installations at the busier stations.

▶ *Royal Cambodian Railway.*—Has received four passenger and 75 freight cars, Australian-built as a gift under the Colombo Plan. Perry Engineering, Commonwealth Engineering, Industrial Steels and Bradford Kendall participated in the order.

▶ *Sorocabana Railway.*—Has ordered eight diesel engines from Sterling Precision Corp. of South Bend, Indiana (U.S.A.), for the repowering of existing motive power. Installation of the units will begin in January, and the work is part of a general rehabilitation program planned by the Brazilian government.

▶ *South African Railways and Harbors.*—Have received bids for fifty 10-ton highway vehicles and twenty special insulated trailer chassis; orders for road-service vehicles during the first half of 1960 totalled £575,102.

▶ *Soviet Union.*—Ekonomicheskaya Gazets, the leading Russian economic newspaper, has reported that about 40 per cent of the

CONTINUED ON PAGE 60

Hedjaz Railway Asks Bids for Rebuilding

Bids for reconstruction of the 842.6-km stretch of the Hedjaz Railway between Ma'an, Jordan, and Medina, SaudiArabia, are being asked by the Executive Committee for the Recommissioning of the Hedjaz Railway Line in Damascus. Contracts to be let will cover the following work:

- All earthwork including cut and fill, drainage, and excavation for structures, sand-drift fences, etc.
- Dismantling and removal of existing rails, rail accessories, turnouts and small parts; classification of materials removed; and storage of materials as directed.
- Removal, cleaning, crushing and reapplying of existing ballast and supply and installing of new ballast.
- Furnishing of new sleepers according to specifications.
- Furnishing of new rails and fastenings, together with complete turnouts and crossings.
- Hauling and distribution of all new and serviceable reclaimed rail and sleepers to site and construction and ballasting of track.
- Rehabilitation of existing drainage structures and construction of new drainage structures.
- Rehabilitation of existing structures and watering facilities, and construction of new facilities.
- Furnishing and construction of a wire communications system.
- Reconditioning of existing shop facilities and supply and installation of new shop equipment.
- Removal of all existing locomotives and rolling stock and disposal as directed by the executive committee.
- Erection of sand-drift fencing using discarded sleepers and furnishing and installing all signs and markers.

The executive committee has reserved the right to divide the project (excluding wire communications and furnishing of rails and fastenings) into two portions: Ma'an to O-oula and O-oula to Medina. The committee also may divide work into four parts: earthwork; track materials; track and structures; and telephone communications,

The following tender documents may be obtained from the Executive Committee at the prices listed: book of conditions, 20 Syrian Pounds; specifications, £S 20; design report, £S 40; contract drawing, per sheet, £S 2.00; profile, per sheet £S 50.

Proposals will be received until 3 April, 1961, and further information may be obtained from the chairman of the executive commission, POB 134, Damascus, UAR Northern Region (Syria).

Italian Railroads Ahead on Five-Year Improvement Program

Severo Rissone, director general of the Italian State Railways, has announced that goals of the government's five-year (1958–63) railroad improvement plan will be reached a year earlier than anticipated. By 1962, he says, all phases of the original plan will have been completed, and a new five- or 10-year plan will probably be drawn up. The current five-year plan includes extensive dieselization and electrification; additional safety measures; improved signaling and communications systems; new stations and other buildings; and replacement of thousands of kilometers of rail. With almost half of the country's mileage already electrified, Mr. Rissone predicts that steam locomotives will all but disappear from Italy by 1970.

. . . The Ministry of Public Works has announced plans for three extensions of Rome's five-year-old subway line, which now has 6 km in operation. Lines will extend to Piazza Venezia, Porta di Popolo, and Nomentano.

●

HUNGARY: State planners anticipate a 100 per cent increase in bulk freight traffic, an increase of 60 per cent in transit traffic and a 25 per cent growth of passenger traffic on the Hungarian State Railways (MAV) by 1975. To meet increased traffic needs, MAV plans to bring the entire system to 23-ton axle loading, using long welded rail and steel-concrete sleepers. Double-tracking of heavily-trafficed main lines is also contemplated. In the motive-power field, electric traction is expected to handle 21 per cent of traffic by 1965, and 29 per cent by 1970, while diesel traction is to handle 20 per cent and 40 per cent by those respective dates. According to plan, steam traction will account for only 31 per cent of traffic by 1970, compared with 89 per cent in 1958.

GERMANY: The German Federal Railways (DB) have inaugurated "auto-in-train" service between Hamburg and Munich. Passengers traveling between the two cities, in either coaches or sleeping cars, may have their automobiles transported in specially-equipped baggage cars on the same train.

. . . It is estimated that about 13 per cent of the entire DB system—over 4000 km—will be electrified by the end of 1961.

JAPAN: Two new subway lines and an extension of an existing line will go into service in Tokyo during February and March under current plans of the Metropolitan Rapid Transit Traffic Corporation. The lines are a 2.8-km extension of the Marunouchi line to Shin Nakano; a 2.1-km branch of the same line between Nakano Sakaue and Nakano Fujimicho; and a 4.5-km section of the Hibiya line which is to be completed in its entirety by 1964. Meanwhile a new section of the Number One Tokyo Subway line was placed in service. The new section connects Oshiage station in Sumida Ward with Asakusabashi station in Taito Ward. The Number One line began construction in 1958, is expected to be completed by mid-1963, and will be jointly operated by the Tokyo Metropolitan Government and the Keisei Railway Company, a private concern.

SPAIN: A three-km extension to the Madrid underground railway—from Ventas to Arturo Soria—will be built shortly. It will have four new stations.

SOVIET UNION: For the Soviet Railways, during the first nine months of 1960, 317 electric locomotives and 958 diesel units were produced.

. . . The Soviet Union has announced plans to speed up the electrification of the Trans-Siberian railroad. In accordance with the new schedule the Irkutsk-Vladivostok section will be electrified by 1965. As of 15 November 1960, electric locomotives were in service on 4,500 km of the 5,400-km Moscow-Irkutsk section.

FRANCE: Success of the "car-sleeper" services of the French National Railways (SNCF) has led to the continuation of the service on the Boulogne-Lyons and Paris-Avignon routes, and the introduction of a new service planned for 1961. The new service will link Paris and Biarritz.

. . . The SNCF is reported to be studying possible tariff revisions to assist existing companies in industrially undeveloped areas, and to encourage new industrial development in such regions. Instead of being based on the present station-to-station index system, tariffs also would take into consideration the freight-handling capacity of local lines. Thus, areas where more traffic could be handled easily would be given lower rates. Tariff revisions would be made in accordance with provisions of the Rome treaty.

(Advertisement)

TO SELL . . .

197 machine-rolled disc-centered wheels;

Siemens Martin steel; 50 kg per sq mm; outside diameter, 750 mm; width, 86 mm; rough bore, 167.5 mm; length of hub, 178 mm; projection of hub, beyond back face, 84.3 mm.

Write: **Compagnie Centrale de Construction, Haine-St.-Pierre, Belgium**

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THE NAME THAT HAS CONSISTENTLY TYPIFIED THE BEST IN TAMPING EQUIPMENT FOR MORE THAN 40 YEARS

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1 JACKSON TRACK MAINTAINER

For both putting up and maintaining track of finest, longest-lasting quality at minimum cost, this is the finest tamping machine money will buy. Powerful vibratory action and complete push-button control make it exceedingly fast. It's overwhelmingly first choice of U.S.A. railways. Available in U.S.A. standard and wider gauges.

2 JACKSON UNIVERSAL

An excellent production tamper which rapidly produces complete consolidation of ballasts up to 3" in diameter in proportionate out-of-face raises. Highly efficient in tamping hanging ties or sleepers. Entirely push-button operated. Jacks and automatic spacer for double joint ties optional. Available in all standard gauges from meter to widest.

3 JACKSON MONORAIL

A complete tamping machine ideal for spotting and smoothing, secondary programs and all yard track maintenance. Utilizes powerful "Maintainer" tamping units. Traveling, indexing and workhead are all hydraulically controlled. All standard gauges.

4 JACKSON HAND TAMPERS

Vibratory-electric . . . operated from portable power plant serving 4 tampers. Universally used in low lift and smoothing work as well as major ballast insertion operations. Adjustable handles and interchangeable tamping blades make them quickly adaptable to all workers and tamping requirements.

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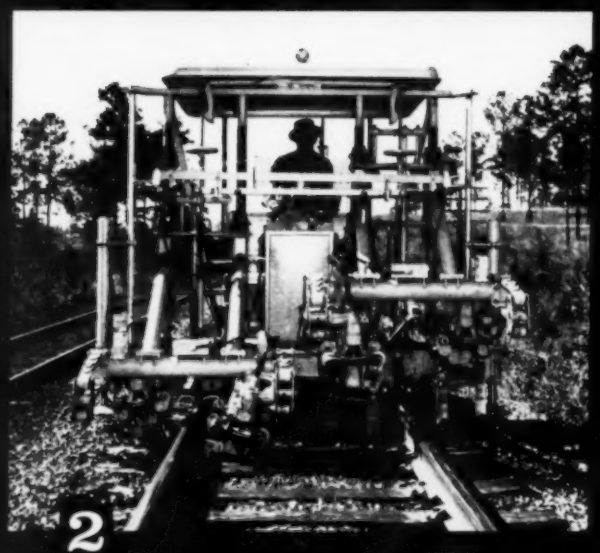

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1. MACHINE JACKSON POUR L'ENTRETIEN DES VOIES

Action vibrante à grande capacité. Service complet par appui sur bouton. Meilleur pour la pose et l'entretien des voies. Système le plus demandé par les chemins de fer américains. Livrable pour tous les écartements de voie standard E.U.A. et autres.

2. JACKSON UNIVERSAL

Une bourreuse à production excellente, donnant une consolidation rapide au ballast. Très efficace pour fixer les traverses. Vérins et régulateurs automatiques de traverses à double joints au choix. Service par appui sur bouton. Livrable pour tous les écartements de voie d'un mètre et plus.

3. JACKSON MONORAIL

Machine à bourrer complète, à fonctionnement hydraulique. Excellente également pour marquer, égaliser et entretenir les voies. Tous les écartements normaux.

4. BOURREUSE À MAIN JACKSON

A vibrations électriques, opéré d'une centrale électrique portable desservant quatre bourreuses. Manettes et aubes réglables pour buts divers.

1. JACKSON GLEISUNTERHALTER

Leistungsfähige vibrierende Tätigkeit. Vollständige Druckknopfbedienung. Die beste Maschine zum Anlegen und Unterhalten der Gleise. Wird von allen amerikanischen Eisenbahnen bevorzugt. Lieferbar für alle Spurweiten.

2. JACKSON UNIVERSAL

Besonders zweckmässig zum Feststopfen der Bettung. Hebewinde und automatischer Regler von Schwellen mit doppelten Stopfflächen. Druckknopfbedienung. Lieferbar für alle Spurweiten.

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Elektrisch vibrierend, wird von tragbarer Kraftzentrale geleitet, die vier Gleisstopfmaschinen bedient. Umstellbare Hebel und Schaufeln für verschiedene Zwecke.

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Intensa acción vibratoria. Sistema completo de botones para los mandos. La mejor máquina para la instalación y el mantenimiento de las vías, preferida por la inmensa mayoría de los ferrocarriles norteamericanos. Puede obtenerse en anchos de 143.5 cm o mayores.

2. JACKSON UNIVERSAL

De extraoridinaria eficiencia para el apisonado en general y de traviesas salientes. El equipo opcional incluye gatos y espaciador automático de doble traviesa. Accionada por botones. Para anchos de vía de un metro o mayores.

3. MONORRIEL JACKSON

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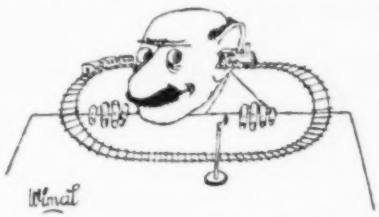
Railway Bookshelf

Le Matériel Moteur SNCF by Jacques Defrance (Editions Sefma, 5, Place Jussieu, Paris 5e)—This 320-page paperbound volume, while it may have been intended primarily for the railway enthusiast, will be of interest to every railwayman concerned with the development of locomotives and self-propelled rolling stock. The enthusiast will perhaps be most attracted by the section on steam power; the serious reader's attention will be drawn by the sections on diesel and electric locomotives and railcars. Basic technical details are given for all classes, from ex-"Bourbonnaise" steamers and 31-hp loco-tractors to the latest high-speed electrics; an illustrative section (annoyingly distant from the tabulated technical information in the make-up of the book) contains photos and scale drawings (1:250) by the author covering almost every class. As any book must be, this one is somewhat out of date in some cases; an appendix brings the information up to the start of 1960 however.

En-Essertjes (Netherlands Railways, Utrecht)—This little booklet of cartoons from "Tussen de Rails," a monthly magazine carried on Netherlands Railways passenger trains, is an interesting example of railway public relations, quite aside



Courtesy Netherlands Railways

from being one of the more amusing cartoon collections to appear recently. Not primarily devoted to railway subjects, the booklet nevertheless contains some of the most amusing examples of this rather rarified art. A few examples are comprehensible only in Dutch; most are in any language.

The Robertson Guide to World Screw Thread Standards (W. H. A. Robertson and Co., Ltd., Lynton Works, Bedford, England)—The best introduction possible to this small volume comes from the publisher, a manufacturer of machinery and tools: "The engineering world is so bedevilled by the multiplicity of screw threads that we decided to collate in one volume the screw thread standards of the world, and give them a common denominator of comparison." The acuteness of the problem (see "World Poll," p. 52, for some of the ramifications of the question as they apply to the railway world) makes this a valuable project indeed. Over 2000 standards are listed for the 33 countries having national screw thread standards, together with 108 drawings of thread forms of every conceivable kind. Each national standard is listed in tabular form showing the standard reference, equivalent thread series, and thread form as shown in the drawings; a small section on self-tapping screws is appended. While such a compendium will hardly solve the problem, the investment of 10 shillings ($1.40 US) will go far toward helping engineers, purchasing agents, and the like to live with it.

Steam on the Sierra, by Peter Allen and Robert Wheeler (Cleaver Hume Press, Ltd., London)—Two far-ranging travelers with a love for the Iberian Peninsula and narrow-gauge railways have combined the two subjects and done the narrow-gauge lines of Spain and Portugal to an affectionate fare-thee-well.

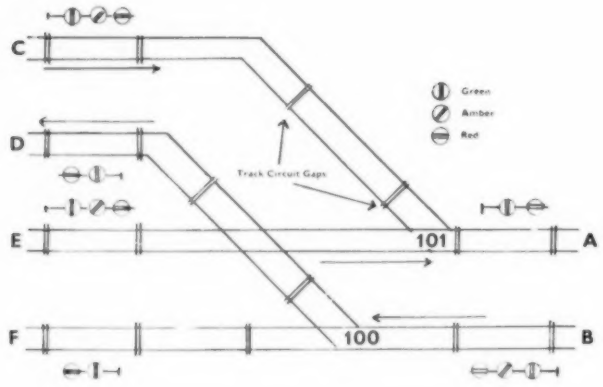
Britain: Transistors Will Cut I

British Railways are to install an electronic signal interlocking plant in the signal box at Henley-on-Thames on the Western Region. The Henley installation will have electronic circuits incorporating transistors, semi-conductor diodes and ferrite cores. With no moving parts, electronic circuitry could lead to important reductions in maintenance costs. British signal engineers have been interested in the development of electronic interlocking for some time and the Henley installation will provide field trials under actual operating conditions.

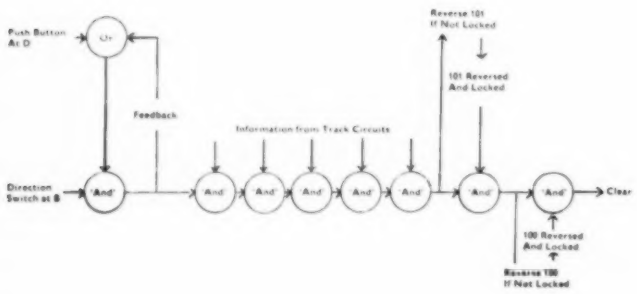
The present development arose from a suggestion made to the Imperial College in London by A. W. Woodbridge, the BTC's Chief Signal Engineer, that the problem of applying electronics to signal interlocking should be a subject for post-graduate research. This suggestion was accepted and two graduates prepared a thesis which formed the basis of a paper presented to the Institution of Railway Signal Engineers. Following this, Mullard Equipment Ltd. were given a development contract to produce an electronic signal interlocking plant which would meet the railway's stringent safety requirements.

The electronic system uses computer-like techniques while controls and track diagram are of the conventional entrance-exit and push-button pattern. The necessary interlocking is achieved with "and" and "or" gating circuits familiar in computer construction. A simplified example of the sequence of events in setting up a route from B to D on the adjoining diagram is as follows. The pulse from the push-button at D is fed to an "or" gate which sets up a feedback path to maintain the circuit. The output from the "or" gate is fed, together with the signal from the switch at B, to the "and" gate which then—and only then—gives an output to the first track circuit "and" gate.

TRACK DIAGRAM



DATA-HANDLING SEQUENCE

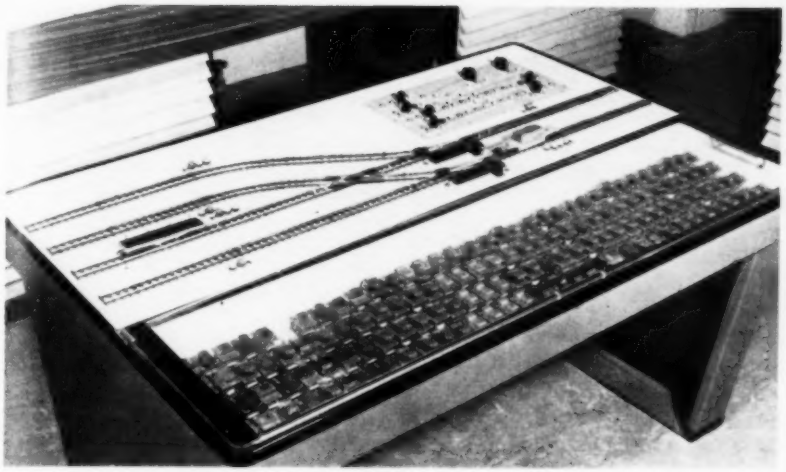


Input and Output

This input together with the input from the track circuit (providing this is clear) will result in an output to the next track circuit "and" gate and so on. After all the track circuits have given the information that they are unoccupied, turnout 101 is reversed, providing it is not locked, and the signal from the track circuits together with the information that 101 is now reversed and locked is fed to another "and" gate. Turnout 100 is now reversed and locked, and this information, together with the output from the last "and" gate, is fed to the final "and" gate, the output of which clears the signal at B.

This is a logical process and if for any reason the required information does not reach any one of the "and" gates in the chain the sequence will be broken and the route will not be cleared. When a route has been cleared and a train traveling in the direction B-D, for example, has passed over the first track circuit in the route, the signal is automatically returned to "stop." Although the direction switch is still set, this route cannot be used again, by pressing the exit button, until the whole sequence of calling has been repeated.

Interlocking Costs



Model shows typical double-junction interlocking; transistorized logic units are in foreground.
Modèle montrant double-bifurcation d'enclenchement; pièces à transistors à l'avant-plan.
Modell eines typischen Gabelungsstellwerkes; im Vordergrund Transistorzellen.
Modelo de un enclavamiento; las unidades transistorizadas se ven en la parte anterior.

In addition to the interlocking of the points and the use of track circuits, there is also a device whereby if a signalman has set up a wrong route (B-F instead of B-D for example) he is unable to reset the route immediately if a train has already entered the approach track circuits. He can however set all signals to red, and after a suitable time delay to allow the train to stop, the route can be reset.

The logic system can therefore provide an anti-preselection device and an approach locking device to meet signalling requirements. Track circuits are of the normal type. The electronic logic units are designed to operate safely in ambient temperatures between —20 degrees and +50 degrees C. In the event of any electronic component breaking down it will immediately "fail safe," switching all the appropriate signals to red.

Enclenchement électrique nouveau

Les British Railways installeront sous peu un nouveau type d'installation électronique d'enclenchement à Henley-on-Thames. L'emploi de transistors et d'autres pièces modernes électroniques réduiront grandement les frais d'entretien de l'installation.

Neues elektronisches Stellwerk

Die British Railways bauen bei Henley-on-Thames eine neuartige elektronische Stellwerkanlage. Mit Transistoren und anderen neuzeitlichen elektronischen Zellen hofft man, die Wartungskosten für die Anlage in hohem Masse herabzusetzen.

Nueva instalación eléctrica de enclavamientos

Los British Railways instalarán un nuevo tipo de instalación electrónica en Henley-on-Thames. El empleo de transistores y otras piezas electrónicas reducirá considerablemente los gastos de mantenimiento de la planta.

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World Market CONTINUED

USSR's total imports of "machinery and equipments" consists of means of transportation: electric locomotives, diesel locomotives, motor cars, passenger and freight cars and ships. Major suppliers of railroad rolling stock are Poland, East Germany and Hungary, where the Soviet Union has fostered development of transportation equipment industries by guaranteeing markets through long-term trade agreements. Railroad rolling stock was recently included, for example, in the list of items which Poland will export to the Soviet Union during 1961 under the terms of a new protocol which is the first practical implementation of the Soviet-Polish five-year trade agreement.

▶ *Swaziland Protectorate.*—Will receive a new railway if proposals now being negotiated by the Anglo-American Corp. in Johannesburg and a Japanese syndicate representing the Fuji and Yawata iron and steel concerns bear fruit. The rail line, which would tap iron ore reserves estimated at ten million tons production during the first ten years of exploitation, would be built by the British government, to connect with the railways of Mocambique to provide an outlet to the sea. The Portugese government is reported to be willing to extend its Mocambique railways to provide a connection.

▶ *Swiss Federal Railways.*—Have taken delivery of the first of six Bm 4/4 diesel-electric locomotives—a 1200-hp Bo-Bo hood unit. The design is intended primarily for heavy shunting service.

▶ *Tatra Wagon Works (Czechoslovakia).*—Will begin production in 1961 of a new four-axle covered freight car incorporating a removable roof and wide sliding doors to facilitate rapid loading and unloading by mechanical materials-handling equipment.

▶ *Victorian Railways.*—Have received from the state government a loan fund allocation of £11,000,000 (Aust.) for purchase and construction of capital improvements to the end of 1961. The major portion of the allocation will be devoted to the Albury-Melbourne gauge standardization project and associated work, including reconstruction of the main Melbourne terminal at Spencer Street; a new motive power servicing depot at Dynon, and a cross-over at North Melbourne to separate suburban and through traffic. The balance of the allocation will be assigned to replacement of rolling stock and equipment; grade separation and crossing protection, and other improvements.

▶ *Viet Nam.*—The Railway Authority is planning to build at Cholon a new freight station to cost about 540,000 piasters ($15,390 US).

▶ *Western Australia Government Railways.*—Will build more than 100 freight cars in railway shops at Midland Junction during the next six months. Included are ten QMB automobile carriers (IRJ, October 1960), 15 two-axle EB cool-storage vans, 50 RCB bulk traffic cars, and 50 VF ventilated cars.

▶ *Westinghouse Air Brake Co.*—Has received orders for brake equipment for 1000 freight cars for Mexico; through its Italian affiliate and Nippon Air Brake, a Japanese associated company, orders were received for 280 sets of locomotive brake equipment (units to be built by a group of Italian builders) and brake gear for 150 diesel railcars to be built in Japan, in both cases for Argentina.

THAILAND

CONTINUED FROM PAGE 19

investment proposal for the purchase of mechanized track maintenance equipment, and 7.5 million Baht for extension and improvement of the present civil engineering department workshop, especially for the repair of switches and crossings and also for the repair and construction of mechanized maintenance equipment.

The growing shortage of hardwood for railway sleepers has presented problems for permanent way forces; depletion of forest reserves has made necessary the use of more and more softwood sleepers with a life of only three or four years. To extend the life of the 480,000 sleepers replaced each year, and to conserve forest resources, a new impregnation plant is to be built on the Northeastern line, at a cost of 8 million Baht.

Other projects in the plan include the replacement of 20 wooden and 34 concrete station buildings, construction of about 90 new station buildings, and the building of various office buildings for various departments of the railway administration.

To provide additional living quarters, which are furnished free of charge to certain classes of employees, 48 million Baht has been allocated under the program, and 1.2 million Baht will be spent for the installation of lifting barriers at important level crossings.

Finally, to meet the cost of unforeseen miscellaneous requirements during the program the railway has included an annual reserve of five million Baht during each year of the program.

Financial requirements for the program—a total of 1,096,831,000 Baht—will come from the railway's accumulated depreciation fund (203 million); railway net income (143.4 million); a grant from the state treasury (247.2 million); an anticipated loan from the International Cooperation Association for technical training facilities (40 million); and a proposed new loan from the International bank for Reconstruction and Development, providing $22,360,000 US for foreign currency requirements (469.5 million).

The program represents a major step forward for Thailand's railways, and nowhere is the reasoning behind it put more aptly than in the introduction to the investment program:

"The railroad has been, and will still be, the backbone of transportation within the country. The railway network today is still the best organized and most comprehensive of all media of transportation."

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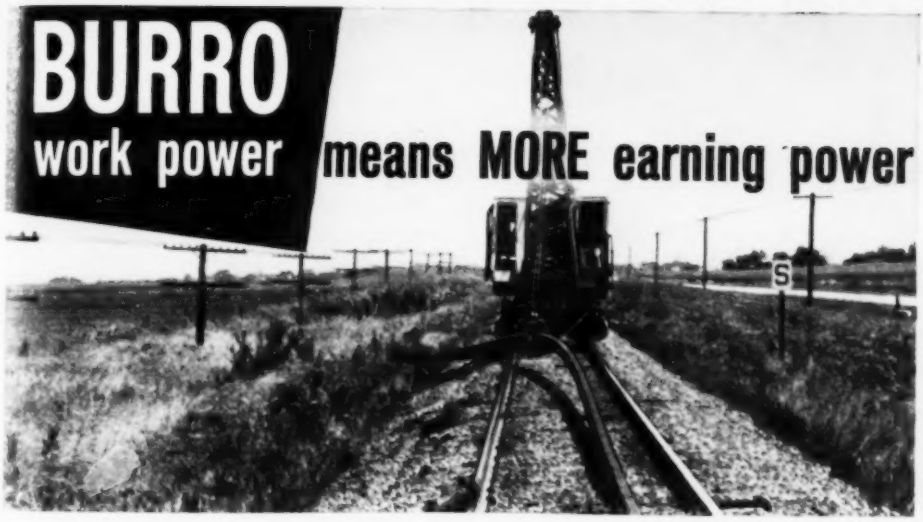

Burro Crane, with threader suspended from boom of the crane to guide the rail, shifting new welded rail from the shoulder to the center of track.

Model 40 Burro Locomotive Crane Ditcher with long digging radius to permit starting ditch ample distance from track. This Model 40 Burro not only digs ditch and loads both near and far ends of cars, but also hauls its own cars with its own power.

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WORLD POLL CONTINUED

In addition to the formal poll question, International Railway Journal asked a number of railwaymen and engineers with the supply industry for some frank comment on the problem. A standardization engineer with one of the large manufacturers had some revealing comments. "The biggest problem comes when we have to fit auxiliary equipment of varying standards—such equipment as air compressors, pressure gauges and the like, which we do not manufacture ourselves. It is entirely possible to end up with three or four different sets of thread standards in a single piece of rolling stock, and of course this complicates matters for the railway company." The different standards of measurement, metric and English, are an annoyance rather than a serious problem to his firm.

The biggest difficulty with regard to measurement systems was generally thought by those interviewed to occur in routine line maintenance rather than in manufacture. "When you work with high-precision micrometers it is not much of a problem, but when you start using standard 'go-no go' gauges there is bound to be trouble."

Clearly, the problem will continue until greater standardization is achieved—whether on metric systems, as a majority of those replying to the survey suggest, or on some other set of standards.

After Hours with Jim Lyne

MEXICO ADVANCES—The railway administration in Mexico is keeping the President of the Republic busy, dedicating new railway installations. On one recent tour alone President López Mateos opened new terminal facilities at Ciudad Juarez and Guadalajara; and on his way from one ceremony to the other he stopped off to inspect the Chihuahua-Pacifico Railway, construction of which is scheduled for completion in May of this year (IRJ January 1961, p. 32). General Manager Benjamin Mendez of the National Railways accompanied President López Mateos on his tour.

The new terminal at Ciudad Juarez comprises an airconditioned passenger station of advanced architectural design, and new parcels and goods sheds, as well as ancillary installations, including signaling—total cost in excess of 9,000,000 Mexican pesos.

The terminal at Guadalajara is a much larger installation—involving an outlay of approximately 70,000,000 Mexican pesos—and includes, besides the modern passenger station, improvements to workshops, permanent way and access roads. At Guadalajara, General Manager Mendez called attention to the several recent dedication ceremonies for new terminals (Mexico City, Monterrey, Torreón, Ciudad Juarez) and indicated his belief that the program of railway progress would continue in his country.

RAILWAY DAY—Mexican railwaymen—management and employees alike—are now recognizing each year on 7 November the anniversary of the death of a railway hero, Jesús Garcia—an engine driver on the Nacozari Railway who gave his life to move a burning carload of explosives away from the village of Nacozari—since renamed "Nacozari de Garcia" in his memory.

On this day, the officers of the railway and of the railway union (Sindicato de Trabajadores Ferrocarrileros) join in commemorative exercises; and it is on this day that the National Railways distribute awards to employees for exceptional service during the preceding year.

DIESELS A MISTAKE?—A US railway electrical engineer, H. F. Brown of New York, created quite a stir in the British press by a paper presented in London on 30 November 1960, to the Institution of Mechanical Engineers. In that paper (which has been published by the Institution—1 Birdcage Walk, Westminster, London SW 1), Mr. Brown questioned one of the most widely accepted beliefs regarding railway motive power, viz., the economic superiority of diesel-electrics over steam. He concedes that in the USA the diesel-electric has effected economies in shunting service, sufficient to pay interest on the added investment; but insists that the economies of the diesel-electric in line-haul are not great enough to repay the additional capital costs.

Meantime, Dr. Burton Behling, economist for the Association of American Railroads, has estimated the economies in fuel and repair expense alone—diesel-electric locomotives compared to steam—at US $877 million annually, a sum which would pay interest on a rather large investment.

TON-KM PER PERSON—Dr. Renato Feio, formerly head of Brazil's federal railway system and now a transportation consultant, has shown me a tabulation he has compiled of railway ton-kilometrage per inhabitant (1956) for a large number of countries. The contrast is startling. Canada heads the list with 7,369. USA comes next with 5,567 and Russia next with 3,902. Dr. Feio sees a wonderful opportunity for more intensive use of railways in his own country, where the total is only 181 ton-km per inhabitant—in an area of great distances and a large tonnage of raw materials.

Dependable G-E diesel-electrics chosen to haul ore through African jungle

Seven General Electric universal model diesel-electric locomotives will soon be operating in the tropical jungles of central Africa. These 1330-hp locomotives were ordered by the French Mining Company COMILOG (Compagnie Miniere de l'Ogooue) to haul thousands of tons of manganese ore daily to a coast port 300 miles away.

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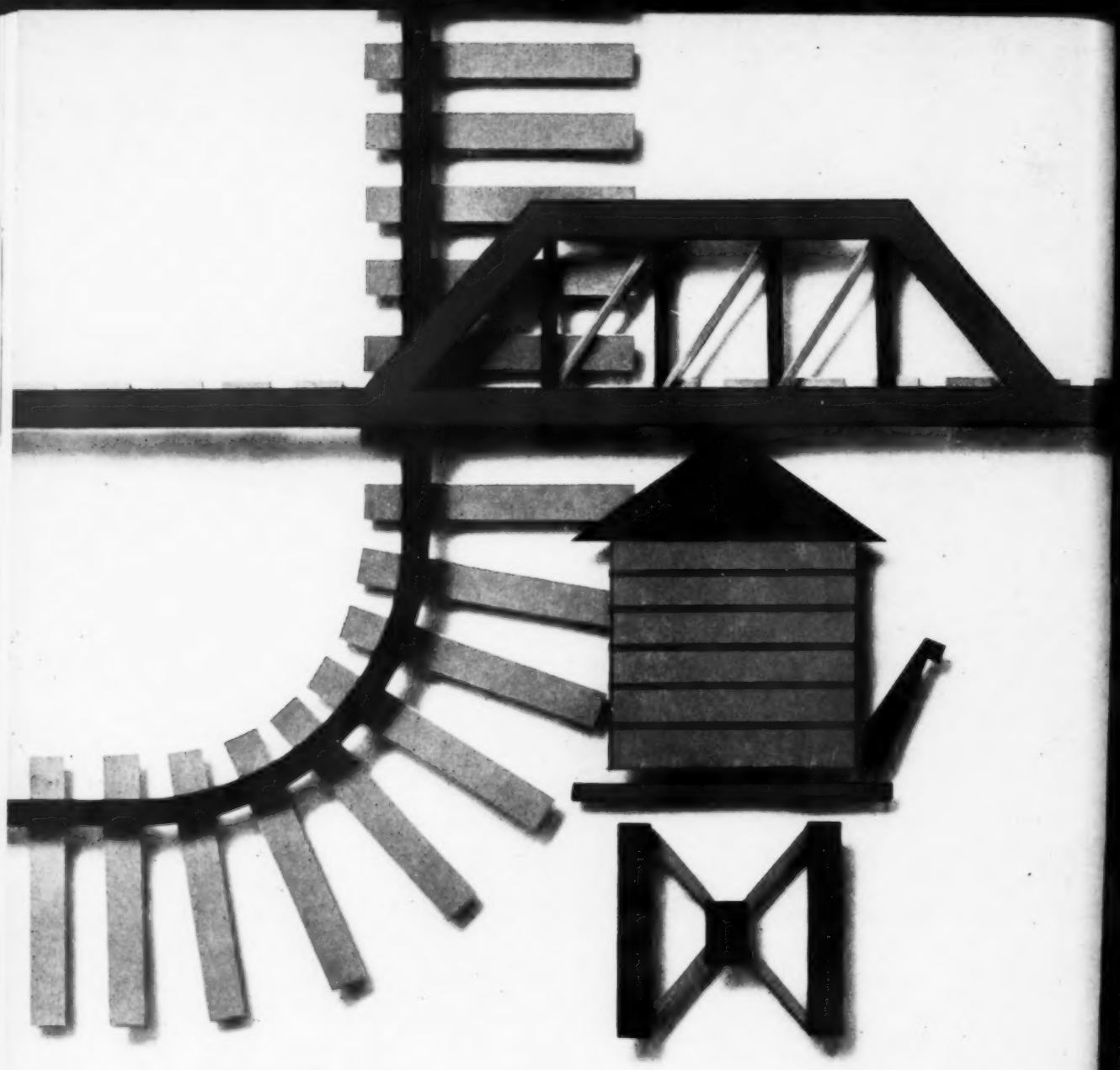

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